Former Manufacturing Plant Area
Gibbsboro, New Jersey

Prepared for:
The Sherwin-Williams Company

October 2018

565473

consider it done

LNAPL Investigation Report

Prepared by:
EHS Support LLC

TABLE OF CONTENTS

LIST OF TABLES WITHIN THE TEXT

LIST OF TABLES AS ATTACHMENTS

LIST OF FIGURES WITHIN THE TEXT

LIST OF FIGURES AS ATTACHMENTS

LIST OF APPENDICES

ACRONYMS

AMSL	above mean sea level
ACO	Administrative Consent Order
AOC	Administrative Order on Consent
API	American Petroleum Institute
AST	aboveground storage tank
ASTM	American Society of Testing Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGM	Concentration Gradient Method
CLP	Contract Laboratory Program
COPC	constituent of potential concern
Conetec	Conetec, Inc.
CPT	Cone Penetration Testing
cSt	centistokes
DCC	dynamic closed chamber
DNA	deoxyribonucleic acid
DO	dissolved oxygen
DOC	dissolved organic carbon
DOT	Department of Transportation
DPK	DPK Consulting, LLC
DQA	data quality assessment
DUE	data usability evaluation
EC	electrical conductivity
ECDI	East Coast Drilling, Inc.
EHS Support	EHS Support LLC
EMC	electromagnetic conductivity
EPH	extractable petroleum hydrocarbons
FID	flame ionization detector
FMP	Former Manufacturing Plant
foc	fraction of organic carbon
FPR	Free Product Recovery
GPR	ground penetrating radar
GPS	global positioning system
HASP	Health and Safety Plan
Hilliards Creek Site	Sherwin-Williams Hilliards Creek Site
IDW	investigation-derived wastes
IEC	Immediate Environmental Concern

ITRC	Interstate Technology and Regulatory Council
LIF	Laser Induced Fluorescence
LNAPL	light non-aqueous phase liquid
LOE	lines of evidence
MADEP	Massachusetts Department of Environmental Protection
MIP	Membrane Interface Probe
MNA	monitored natural attenuation
NAPL	non-aqueous phase liquid
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
NSZD	Natural Source Zone Depletion
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbons
PID	photoionization detector
PTS	PTS Laboratories
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
qPCR	quantification of polymerase chain reaction
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RI	Remedial Investigation
RIR	Remedial Investigation Report
SARA	Superfund Amendments and Reauthorization Act
SBT	soil behavior type
SGP	soil gas probe
Sherwin-Williams	The Sherwin-Williams Company
SIM	selective ion monitoring
SIP	stable isotope probing
SOP	Standard Operation Procedure
SOW	Scope of Work
SRP	Site Remediation Plan
SS	sub-slab
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
SZNA	source zone natural attenuation
TAL	Target Analyte List
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TestAmerica	TestAmerica Laboratories, Inc.
TIC	tentatively identified compound

TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSDF	treatment, storage, and disposal facility
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UV	ultraviolet
VFA	volatile fatty acid
VOC	volatile organic compound
VPH	Volatile Petroleum Hydrocarbons
Work Plan	LNAPL Investigation Work Plan

EXECUTIVE SUMMARY

Light non-aqueous phase liquid (LNAPL) is present in soil at the Former Manufacturing Plant (FMP) area of the Sherwin-Williams/Hilliards Creek Site (Hilliards Creek Site or Site). Investigations of, and interim actions to control, the LNAPL have been conducted under the oversight of the United States Environmental Protection Agency (USEPA) and New Jersey Department of Environmental Protection (NJDEP) since the late-1980's. The nature and extent of the LNAPL, based on several lines of evidence, was presented in the FMP Remedial Investigation Report (RIR) (Weston, 2018). The FMP RIR also included preliminary conclusions regarding controls (i.e. limiting factors) on LNAPL recoverability and mobility that were originally provided to USEPA at a December 2016 meeting.

To better inform decisions about how to best address the LNAPL, Sherwin-Williams conducted an extensive supplemental sampling program designed to better refine its understanding of a number of key issues:

- The extent to which Site geology and hydrogeology may have influenced historical LNAPL transport and current LNAPL mobility and recoverability;
- The composition, vertical and horizontal extent and residual saturation levels (LNAPL content within the soil matrix) of the LNAPL;
- The role of the LNAPL as a source of dissolved-phase constituents in groundwater and vapor-phase constituents in soil gas; and
- Mechanisms that may be responsible for degradation of the LNAPL and attenuation of dissolved-phase constituents in groundwater.

Field investigation activities were conducted pursuant to the *LNAPL Investigation Work Plan* (Work Plan; EHS, 2017) that was accepted by USEPA on July 25, 2017, following a series of comments and responses.

The results of the recently-conducted investigation as well as historical data collected during and prior to the remedial investigation (RI) have been analyzed consistent with USEPA and Interstate Technology and Regulatory Council (ITRC) guidance (USEPA, 2005 and ITRC, 2009b) to answer several questions of significance in determining the appropriate approach(es) to addressing the LNAPL:

Geology and Hydrogeology

- What is the spatial distribution of the fine-grained soil intervals relative to LNAPL sources?
- How do seasonal water table fluctuations contribute to mass losses and residualization (trapping of LNAPL within soil pores) of LNAPL?

Investigation activities found that fine-grained soil (silts and clays) are present as both laterally distinct zones and within pore spaces throughout the fine sand matrix within the historical range of groundwater fluctuations across the FMP area. These finer-grained soils have the potential for higher residual LNAPL saturations than coarser-grained soils because it is more difficult for the LNAPL to move out of the smaller pore throats in the finer-grained soils. Additionally, fluctuations of groundwater levels (up to four feet annually) have allowed redistribution of mobile LNAPL, thereby reducing saturation levels and LNAPL mobility. That is, while sufficient LNAPL heads may historically have been present to drive migration into fine-grained soils, and mobile and recoverable LNAPL was historically present, continued water level fluctuations and other mass loss mechanisms have effectively trapped LNAPL within or below these finer-grained soil horizons.

Nature and Extent of LNAPL

- What were the natures of the historical releases?

- What are the physical and chemical properties of the LNAPL and how are LNAPL constituents partitioned between LNAPL, vapor, sorbed, and dissolved phases?
- How is LNAPL laterally and vertically distributed within the subsurface?

The LNAPL is comprised of predominantly mineral spirits with some aromatic and monocyclic aliphatic compounds (including volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], and associated tentatively identified compounds [TICs]) co-eluted within the LNAPL mixture. Field observations indicate that the LNAPL is heavily weathered in the Seep Area, and chemistry data show depletion of the aromatic fractions in the Former Tank Farm A area, potentially a result of weathering or preferential dissolution.

In general, the effective solubilities of LNAPL constituents are low, but based on dissolved-phase groundwater data from the LNAPL area, the LNAPL is a source of petroleum hydrocarbons (including benzene, ethylbenzene, toluene, and xylenes [BTEX], and TICs) in shallow groundwater. However, since the LNAPL is dominated by low solubility constituents, the magnitude of dissolved-phase concentrations of LNAPL constituents in groundwater is inherently limited.

Residual LNAPL impacts have been observed within shallow soils extending from the Former Resin Plant and Former Tank Farm A area to the Seep Area and Eastern Off-Property area. The lateral and vertical distribution of LNAPL reflects the release, migration, and subsequent residualization history. The lateral distribution of LNAPL impacts from the Former Tank Farm A area indicate that the historical release created a sufficient LNAPL head such that lateral migration (both cross-gradient and downgradient) and vertical migration below the water table (up to a depth of 24 feet bgs) occurred. The presence of residual LNAPL impacts in the Seep Area and Eastern Off-Property areas are primarily attributed to historical lateral LNAPL migration from the Former Tank Farm A area in the direction of groundwater flow. The presence of a groundwater divide in the vicinity of Former Tank Farm A and potentially the presence of fine-grained soils (see above) facilitated migration towards the Eastern Off-Property areas.

A key finding from the investigation is that the majority of LNAPL mass is located at or below the water table with the greatest vertical extent of LNAPL observed in the Former Tank Farm A area. LNAPL impacts within the Former Tank Farm A area extend from the unsaturated zone to up to 14 feet below the water table, in contrast to the residual LNAPL impacts in the downgradient areas where thicknesses range from approximately 2 to 5 feet and are within the range of groundwater elevation fluctuations. In some areas, prior estimates of the vertical distribution of LNAPL were greater than observed during the 2017 investigation. This is attributed, at least in part, to LNAPL depletion over the investigation history (extending back to the early 1990s).

Mobility, Recoverability, and Residualization of LNAPL

- What is the LNAPL mobility and potential recoverability at the FMP area?

Mobile LNAPL is absent on a Site-wide scale, but, as indicated by the presence of measurable LNAPL in a small number of wells within the Seep Area, Former Tank Farm A, and the Former Service Station/Tavern, there are some locations where mobile LNAPL is present. The observation of measurable LNAPL in the wells occurs predominantly during periods of low water table conditions, a result of local LNAPL drainage from the soil pores.

The extent of recoverable LNAPL is more limited and is confined to the Seep Area with recovery volumes dominated by LNAPL removed from one well (H-3P). In all other areas, the monitoring data and petrophysical testing has demonstrated that the LNAPL saturations are well below the literature *values for residual saturation limits (the saturation level at which LNAPL is recoverable) in fine-grained sands (up to 24 percent pore volume). The saturation levels measured by petrophysical testing of soil cores are almost an order of magnitude lower than literature values (on average 3 percent) and reflect the age of the plume and robust natural source zone depletion processes. The low saturations are further supported by EPH concentrations below calculated and literature values for residual mobility thresholds. The low LNAPL saturations (and associated low transmissivity and potential recoverability) in combination with the seasonal variability in groundwater levels and soil heterogeneity are key impediments to LNAPL recovery.*

Natural Mass Losses of LNAPL and Dissolved-Phase Constituents

- Is there evidence of natural source zone depletion (NSZD) processes in the LNAPL-affected areas and/or natural attenuation in the associated dissolved phase groundwater plume, and what are the dominant processes?
- What are the implications of LNAPL presence on dissolved-phase plume longevity at this Site?

There are multiple lines of evidence indicating that natural degradation of LNAPL mass and dissolved hydrocarbons is occurring in the vadose and saturated zones. The key mechanisms of mass losses include volatilization and subsequent degradation within the vadose zone, dissolution into groundwater and biodegradation in the dissolved-phase, and potentially direct degradation of LNAPL through cleavage of aliphatic compounds and subsequent degradation of lower carbon chain by-products.

Key lines of evidence supporting natural mass losses of the LNAPL and natural attenuation of the dissolved-phase constituents include:

- *Biogenic heat signatures within the LNAPL plume area.*
- *Biogenic production of methane and carbon dioxide (and depletion of oxygen) within and downgradient of the LNAPL area.*
- *Stable dissolved phase hydrocarbon concentrations in shallow groundwater proximal to the LNAPL plume area.*
- *Suitable biogeochemical conditions for ongoing natural degradation of dissolved hydrocarbons (and potentially direct degradation of LNAPL within the saturated zone) with biodegradation rates for sulfate reduction and iron reduction likely constrained by the availability of electron acceptors.*
- *A range of biologically-mediated processes contributing to saturated zone mass losses including anaerobic mechanisms (iron reduction, sulfate reduction, and methanogenesis) and aerobic respiration.*
- *Requisite populations of a variety of hydrocarbon degrading bacteria consistent with the range of natural attenuation mechanisms (including anaerobic and aerobic processes).*
- *Baited biotrap data which provides conclusive evidence that biodegradation of ring structures (such as alkylbenzenes and low- to medium-weight polycyclic aromatic hydrocarbons (PAHs) and more easily degraded aliphatic compounds is occurring in shallow zone groundwater.*
- *Literature values for NSZD processes at other LNAPL sites range from 134 to 14,000 gallons/acre/year, significantly exceeding LNAPL mass removal rates via active recovery efforts (81 gallons of LNAPL was recovered from wells in the Former Tank Farm A and Seep Area in 2017).*

Based on the supplemental evaluations presented in this Report, the investigation objectives have been achieved and the key data gap questions have been answered. Overall, the following key conclusions can be made:

- Site operations ceased approximately 40 years ago and thus the primary sources of potential additional releases to the subsurface were removed (e.g., tank farms, manufacturing and storage areas).
- The LNAPL extends laterally from the Former Resin Plant and Former Tank Farm A area to the Eastern Off-Property area and the Seep Area.
- The LNAPL extends vertically as deep as 24 feet bgs in the former Resin Plant/Tank Farm A area, 15 to 16 feet bgs in the eastern Off-Property area, and approximately 5 to 7 feet bgs in the Seep Area.
- The extent of the LNAPL is a result of historical conditions when LNAPL saturations and heads were sufficient to facilitate LNAPL migration from Former Tank Farm A towards the Seep Area and Eastern Off-Property Areas. Natural source zone depletion processes and residualization (associated with water table fluctuations) have reduced LNAPL saturations such that the LNAPL saturations through the majority of the LNAPL-effected area are below residual saturation levels.
- The LNAPL plume is stable with redistribution occurring only within the existing LNAPL plume footprint. In general, the LNAPL is neither mobile nor recoverable. The LNAPL is trapped in the soil pores of the formation predominantly at or below the water table. Finer-grained soils (silts and clays) present as both laterally distinct zones and within pore spaces throughout the fine sand matrix are key controls on the mobility and recoverability of LNAPL, enabling higher residual LNAPL saturations than coarser-grained soils. Fine-grained soils combined with water table fluctuations and several years of recovery activities in the Seep Area have residualized and/or removed the majority of the mobile LNAPL. Recovered LNAPL volumes have been substantially reduced, with only 81 gallons of LNAPL recovered thoughout all of 2017.
- The LNAPL is a source of petroleum hydrocarbons (VOCs, SVOCs, and associated TICs) in shallow groundwater within and immediately adjacent to the LNAPL. However, since the LNAPL is dominated by low solubility constituents, the dissolved-phase concentrations of LNAPL constituents in groundwater is inherently limited.
- There are multiple lines of strong evidence that natural degradation of LNAPL mass and dissolved hydrocarbons is occurring in the vadose zone and saturated zone. The key mechanisms of mass losses include volatilization and subsequent degradation within the vadose zone, dissolution into groundwater and biodegradation in the dissolved-phase, and potentially direct degradation of LNAPL through cleavage of aliphatic compounds and subsequent degradation of lower carbon chain by-products.

This report has achieved the goal of refining the understanding of LNAPL at the Site. On this basis, the LNAPL investigation phase of the project is considered complete with sufficient data to support discussions regarding remedial decision-making.

1.0 INTRODUCTION

Pursuant to Administrative Order on Consent (AOC) Index No. II Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)-02-99-2035, EHS Support LLC (EHS Support), on behalf of The Sherwin-Williams Company (Sherwin-Williams), is submitting to the United States Environmental Protection Agency (USEPA) Region 2 New Jersey Remediation Branch (EPA Remediation Branch) this *Light Non-Aqueous Phase Liquid (LNAPL) Investigation Report* (Report) for the Former Manufacturing Plant (FMP) area of the Sherwin-Williams Hilliards Creek Site (Hilliards Creek Site or Site), located in Gibbsboro, Camden County, New Jersey. The Hilliards Creek Site was listed on the National Priorities List (NPL) in 2008. The Site location is illustrated on **Figure 1-1**.

At the request of Sherwin-Williams, EHS Support reviewed existing environmental investigation data to identify data needs for the assessment of potential remedial alternatives to address LNAPL at the FMP area of the Site. Key investigation data reviewed by EHS Support were included in the following reports:

- *Comprehensive Remedial Investigation Report, The Paint Works Corporate Center* (Paint Works RIR; Weston, 2004).
- *Evaluation of Soil, Sediment, Surface Water and Groundwater Results and Proposal for Additional Site Characterization* – Former Manufacturing Plant, Sherwin-Williams/Hilliards Creek Site (Weston, 2011).
- *Former Manufacturing Plant - Groundwater Technical Memorandum* - Former Manufacturing Plant Area, Sherwin-Williams/Hilliards Creek Site (Weston, 2014).
- *Technical Memorandum for Additional Delineation of Petroleum-Related Constituents at Select United States Avenue Residential Properties* – Sherwin-Williams/Hilliards Creek Site in Gibbsboro, New Jersey (Sherwin-Williams, 2016).
- *Remedial Investigation Report, Soil, Sediment, Surface Water and Pore Water, Former Manufacturing Plant* (Weston, 2016b).
- *Revised Technical Memorandum for Newly Proposed Wells to Complete Groundwater Characterization Activities* (Sherwin-Williams, 2017a).
- *Remedial Investigation Report, Soil, Sediment, Surface Water, Pore Water and Vapor Intrusion,* Former Manufacturing Plant Area (FMP RIR; Weston, 2018).
- *Technical Memorandum Summarizing the Results of Groundwater Sampling at 16 Newly Installed Wells and Proposal for Additional Monitoring Well Installation and Sampling* (Sherwin-Williams, 2018).

The FMP RIR (Weston, 2018) used several lines of evidence to estimate the horizontal and vertical extent to which LNAPL is present in the subsurface. Sherwin-Williams met with the USEPA on December 5, 2016 and presented preliminary conclusions regarding the controls (i.e., limiting factors) on LNAPL mobility and recoverability, as well as observations on the extent to which the LNAPL represents a source of dissolved-phase constituents in groundwater. As part of the meeting, Sherwin-Williams presented to the USEPA a summary of additional investigation activities proposed to refine the understanding of the extent, mobility, and recoverability of the LNAPL.

Sherwin-Williams submitted the draft *LNAPL Investigation Work Plan* (Work Plan) to USEPA on February 17, 2017 to propose the additional investigation activities. USEPA provided responsive comments to the draft Work Plan requesting additional clarification to investigation procedures on June 6, 2017 (USEPA, 2017). Sherwin-Williams then re-submitted the Work Plan and Response to USEPA Comments correspondence to USEPA dated July 12, 2017 (Sherwin-Williams, 2017b). Subsequently, USEPA accepted the revised Work Plan on July 25, 2017.

1.1 Investigation Purpose and Objectives

The purpose of the LNAPL investigation was to refine the understanding of the extent, mobility, and recoverability of the LNAPL within the FMP area of the Hilliards Creek Site. The Work Plan outlined the field activities to collect supplemental data to further characterize Site lithology, LNAPL saturations and potential mobility/recoverability, and the potential for LNAPL to act as a source of constituents of potential concern (COPCs) to environmental media. As presented in the 2017 Work Plan, the objectives of the LNAPL investigation were to:

- Evaluate Site hydrogeologic controls on LNAPL distribution and occurrence.
- Quantify LNAPL saturation and potential mobility.
- Examine residual LNAPL as a source of current and future impacts to groundwater and soil gas.
- Assess LNAPL mass loss mechanisms.

1.2 Data Quality Objectives and Data Gaps

As discussed above, this LNAPL Investigation was undertaken to better understand LNAPL mobility, recoverability, its contributions to dissolved phase COPCs, and the potential for LNAPL to act as a source of COPCs to environmental media. The key data gap questions for this LNAPL investigation are as follows:

Geology and Hydrogeology

- What is the spatial distribution of the fine-grained soil intervals relative to LNAPL sources?
- How do seasonal water table fluctuations contribute to mass losses and residualization (trapping of LNAPL within soil pores) of LNAPL?

Nature and Extent of LNAPL

- What were the natures of the historical releases?
- What are the physical and chemical properties of the LNAPL and how are LNAPL constituents partitioned between LNAPL, vapor, sorbed, and dissolved phases?
- How is LNAPL laterally and vertically distributed within the subsurface?

Mobility, Recoverability, and Residualization of LNAPL

- What is the LNAPL mobility and potential recoverability at the FMP area?

Natural Mass Losses of LNAPL and Dissolved-Phase Constituents

- Is there evidence of natural source zone depletion (NSZD) processes in the LNAPL-affected areas and/or natural attenuation in the associated dissolved phase groundwater plume, and what are the dominant processes?
- What are the implications of LNAPL presence on dissolved-phase plume longevity at this Site?

1.3 Report Overview and Organization

Consistent with USEPA and Interstate Technology and Regulatory Council (ITRC) guidance (USEPA, 2005 and ITRC, 2009b), this report uses a lines of evidence approach leveraging both historical and recently-collected data to answer the data gap questions posed in **Section 1.2**. **Section 2.0** through **Section 4.0** provide relevant background information on various aspects of Site history and data collection efforts to support the analysis provided in the later sections. **Section 5.0** through **Section 8.0** evaluate the data and are aligned with the data gap categories identified in **Section 1.2** for ease of review. Similarly, the findings and conclusions presented in **Section 9.0** and **Section 10.0** are structured to answer the data gap questions. An overview of each section of this Report and the relevant lines of evidence assessed are as follows:

Section 2.0 – Includes a summary of the Site setting, historical operations, historical investigations, and pre-investigation Site LNAPL understanding to provide context for the LNAPL assessment and refined LNAPL understanding presented herein.

Section 3.0 – Provides a discussion of LNAPL fundamentals as an aid to the document reviewer(s) and to support the technical discussion in the following sections.

Section 4.0 – Provides a summary of data quality objectives, data acquisition and evaluation methods, and variances and deviations from the Work Plan for each specific work task including:

- Field Preparation and Site Management
- Cone Penetration Testing / Membrane Interface Probe (CPT/MIP) Characterization Program
- Conventional Drilling Program
- LNAPL Testing Program
- Natural Degradation Testing Program
- Quality Assurance and Quality Control Program
- Variances and Deviations

Section 5.0 – Evaluates the Site geologic and hydrogeologic data and associated controls on LNAPL fate and transport. Drawing on the existing hydrogeologic framework developed through previous investigation work, this section identifies geologic complexity (i.e., the presence of variable fractions of fines within the fine sand matrix) and groundwater level fluctuations and flow as key controls on historical LNAPL migration and ongoing residualization. The key lines of evidence evaluated in this section are:

- Historical geophysical assessments
- Historical and 2017 soil boring logs
- 2017 CPT logs and associated Soil Behavior Type (SBT) characterization
- 2017 high-resolution soil core photography
- 2017 laboratory grain size and soil properties analyses
- Historical groundwater level fluctuations
- Groundwater flow and aquifer properties

Section 6.0 – Evaluates the nature and extent of LNAPL impacts and the relationship between LNAPL, vapor, dissolved, and sorbed constituents. Through an evaluation of the following lines of evidence, the LNAPL physical and chemical properties are well-understood, the lateral extent is well-defined, and the vertical extent is located at or below the water table in all areas away from perceived historical source areas:

- Historical and 2017 LNAPL samples submitted for chemical and physical properties analyses
- Historical LNAPL measurements from wells
- 2017 laboratory LNAPL pore fluid saturation analysis
- Historical and 2017 soil boring logs and the following indicators of LNAPL: visual presence, odors, headspace responses
- Historical and 2017 MIP/ Laser Induced Fluorescence (LIF) responses
- Historical hydrophobic dye assessment
- Calculated threshold values indicative of the presence of LNAPL leveraging historical soil vapor, groundwater, and soil data

Section 7.0 – Building on the assessment of hydrogeologic controls presented in **Section 5.0**, **Section 7.0** concludes that current LNAPL mobility and recoverability are extremely limited and ongoing residualization of LNAPL is important to natural mass losses. The following lines of evidence were assessed to support this discussion:

- Historical interim LNAPL recovery efforts and impacts of water level fluctuations

- 2017 LNAPL transmissivity testing
- 2017 laboratory LNAPL pore fluid saturation and mobility analyses
- Calculated threshold values indicative of LNAPL mobility leveraging historical soil data and literature values

Section 8.0 – Provides an assessment of NSZD and dissolved-phase natural attenuation (i.e., monitored natural attenuation [MNA]) processes within and downgradient of the LNAPL area. The section leverages the current understanding of NSZD and natural attenuation processes and concludes that natural mass losses of LNAPL far outweigh mass removal via active remediation technologies. The following lines of evidence were assessed to support these discussions:

- Natural Source Zone Depletion of LNAPL:
    - 2017 groundwater temperature gradients between monitoring wells
    - Historical soil gas data collected within the LNAPL plume area
- Natural Attenuation of Dissolved Phase Impacts:
    - Historical volatile organic compound (VOC) concentrations
    - 2017 groundwater geochemistry parameters
    - 2017 microbiology population assessment
    - 2018 microbiology biodegradation assessment

Section 9.0 – Provides the refined understanding of LNAPL conditions at the Site based on the lines of evidence presented in the previous sections.

Section 10.0 - Presents the key conclusions from this LNAPL investigation in the context of answering the data gap questions posed in **Section 1.2**.

Section 11.0 – References.

2.0 BACKGROUND

This section presents background information including the Site description, history, overview, and understanding of LNAPL distribution.

2.1 Site Description

The FMP is located in Gibbsboro, Camden County, New Jersey. The FMP is bounded to the north by Silver Lake and Route 561, to the east by United States (U.S.) Avenue, to the west by West Clementon Road, and to the south by vacant land, Cedar Grove Cemetery, and Bridgewood Lake (**Figure 1-1**).

The FMP is comprised of the following subareas (**Figure 2-1**):

- 6 East Clementon Road and the surrounding area: This subarea is located in the northwest corner of the FMP, near the intersection of Foster Avenue and East Clementon Road. Foster Avenue is to the south, East Clementon Road is to the west, Silver Lake and the former Main Plant (see below) are to the east, and the former Lucas homestead historic building is to the north. Included in this subarea are the foundation slabs of the former 6 East Clementon Road building and the 10 Foster Avenue building.
- FMP: This subarea is where the main plant of the FMP was located before the plant was closed. The subarea is located north of Foster Avenue and lies to the east of the 6 East Clementon Road subarea and west of the existing 2 and 4 Foster Avenue buildings. Silver Lake is to the north. Included in this subarea is the Silver Lake conveyance bypass structure. The Silver Lake bypass conveyance structure is an underground culvert that begins just south of Silver Lake, where it receives the outflow from Silver Lake, extends beneath the parking area for the 2 and 4 Foster Avenue and 10 Foster Avenue buildings, and discharges to Hilliards Creek just south of Foster Avenue.
- Former Resin Plant and Former Tank Farm A subarea, and eastern and northern off-property areas: The Former Resin Plant and Tank Farm A subarea is located in the northeastern part of the FMP and is bounded to the east by U.S. Avenue and to the north by the northern off-Property area. The subarea includes portions of the 2 and 4 Foster Avenue and 3 U.S. Avenue buildings. The northern off-property area is located north of the FMP property boundary, to approximately the mid-point of Silver Lake.
- Seep Area and eastern residential subarea: The Seep Area is located south of Foster Avenue and west of U.S. Avenue and includes the 1 Foster and 5 Foster Avenue buildings. East of U.S. Avenue is the southern portion of the eastern off-property area where the residential properties east of U.S. Avenue are located. The Seep Area is bordered to the west by Hilliards Creek.
- Former Lagoon Area: This subarea is located in the southernmost portion of the FMP. This is the location of the former wastewater lagoons that were closed by Sherwin-Williams under New Jersey Department of Environmental Protection (NJDEP) oversight in 1979. The southern off-property area is located to the south of the former Lagoon Area.
- Upper Hilliards Creek: This subarea includes the flood plain of Hilliards Creek beginning just south of Foster Avenue, where the discharge from the Silver Lake conveyance system enters Hilliards Creek, continuing south to West Clementon Road. Also included in this subarea is the area between Hilliards Creek and the residential properties located along West Clementon Road, the 7 Foster Avenue building, the former Pump House and former Tank Farm B.

The topography of the FMP and surrounding areas slopes from the northeast, where the elevations are highest, to southwest. The 6 East Clementon Road, FMP, Former Resin Plant and Former Tank Farm A subareas are at higher elevations than the Seep Area, former lagoon area, and Upper Hilliards Creek. The residential properties located across U.S. Avenue from the Seep Area are also at a higher elevation than the Seep Area parking lot.

Because the FMP property is developed, surfaces such as parking lots and building locations are relatively flat and graded towards stormwater collection points. In the near vicinity of Hilliards Creek and Bridgewood Lake, the topographic gradient slopes gently towards these water bodies.

2.2 Site History and Operations

The FMP was a paint, varnish and lacquer manufacturing plant from the 1850s until 1978. The plant was first operated by John Lucas & Co., Inc., (Lucas) and subsequently by Sherwin-Williams. The plant closed permanently in 1978, and the factory proper was sold in 1981 to Robert K. Scarborough (Scarborough), who redeveloped the former manufacturing facility. The former plant site is currently utilized as an office and light industrial park and is called The Paint Works Corporate Center (The Paint Works) and is owned by Brandywine Realty Trust (Brandywine).

A detailed summary of the Site history is provided in the FMP RIR (Weston, 2018).

2.3 Historical Investigations

Investigative activities and interim-measures have been performed at the FMP since the late 1970s. The majority of the work has been performed by Sherwin-Williams under the oversight of either the NJDEP, the EPA Removal Branch, or EPA Remediation Branch. Some activities were conducted by Scarborough during his ownership of the FMP, and the EPA Removal Branch conducted one phase of soil sampling along Hilliards Creek and vapor intrusion sampling at select locations in the FMP area. Many of the investigations conducted by Sherwin-Williams included groundwater characterization activities as well as soil sampling.

Previous interim measures at the FMP included a removal action in 1979 to remove sludge material and contaminated soil from the Former Lagoon Area and a number of measures, beginning in the 1980s and continuing to the present, are designed to address and prevent discharges from the Seep Area.

A detailed summary of previous investigations and interim remedial measures conducted under NJDEP and USEPA oversight is included in the FMP RIR (Weston, 2018).

2.3.1 LNAPL-Related Previous Investigations and Interim Measures

<u>NJDEP Oversight</u>

Scarborough conducted the first investigation of the Seep Area in 1987. This investigation was under NJDEP oversight and was performed in response to a NJDEP directive to contain petroleum seeps emanating from the parking lot.

Between 1991 and 2000, Sherwin-Williams conducted five phases of remedial investigation (RI) of the FMP, previously referred to as The Paint Works Corporate Center, which included the former Tank Farm A, Tank Farm B and Seep Areas, as well as the former service station/tavern, located at the corner of U.S. Avenue and Berlin Road. Sherwin-Williams performed these RI activities under an Administrative Consent Order (ACO) with NJDEP dated September 20, 1990.

The NJDEP identified the Seep Area as an Immediate Environmental Concern (IEC) and in November 1994, NJDEP issued a Directive to Sherwin-Williams to address the IEC and established remedial action objectives for the IEC. In response to the NJDEP Directive, Sherwin-Williams provided the NJDEP with two work plans to evaluate remedial alternatives to address the immediate environmental concern. Both documents were approved by the NJDEP. Sherwin-Williams identified the most appropriate removal action as a combination of the following components:

- Excavation and replacement of the leaky portion of the storm sewer serving the 1 Foster Avenue building with a sealed system to prevent infiltration of product.
- Excavation and disposal of contaminated soils in the Seep Area between the Police Station (5 Foster Avenue) and Hilliards. Excavated soils were transported to Clean Earth of Maryland for disposal.
- Installation of a Soil Vapor Extraction (SVE) Free Product Recovery (FPR) system with three passive skimmers in the Seep Area near 1 Foster Avenue. The proposed SVE/FPR system would consist of:
    - Automated skimmers installed in the areas where the greatest product thickness was measured to recover product as rapidly as possible. The locations of these skimmers would be adjusted over the course of the remediation to correspond to the locations where the greatest product thickness was measured.
    - SVE vents installed throughout the Seep Area to help collect and remove product. Product captured by the skimmer system would be disposed of off-site at a permitted facility.
    - Treatment of vapors in the SVE off-gas by thermal oxidation.
    - Installation of a manual passive skimmer at MW-11 to recover product. The recovered product was combined with product recovered from the Seep Area near 1 Foster Avenue for off-site disposal.

The initial LNAPL recovery system startup was conducted in November 1997 with FPR pumps installed in December 1997. Routine gauging of groundwater and LNAPL elevations (and associated product thickness) and monitoring of LNAPL recovery rates was conducted to assess system performance.

A detailed summary of previous investigations and interim remedial measures conducted under NJDEP oversight is included in the FMP RIR (Weston, 2018).

EPA Removal Branch Oversight

In July 2001, the NJDEP terminated its ACO with Sherwin-Williams. In April 2002, free-phase product was observed in the Seep Area and reported. On April 29, 2002, EPA issued Sherwin-Williams a Notice to Responsible Party, under CERCLA and Superfund Amendments and Reauthorization Act (SARA) to Respondent ("Expedia Notice"). The Expedia Notice required Sherwin-Williams to perform interim actions to prevent discharge from the Seep Area from reaching Hilliards Creek, along with additional geophysical and soil investigations throughout the FMP area. The interim measures performed included:

- Continued operation and maintenance of the SVE/FPR system and disposal of collected product, as required.
- Continued maintenance of absorbent booms in Hilliards Creek and the riprap area.
- Videotaped inspection and cleaning of the storm drain system to identify and remove any blockage.
- Installation of an interceptor trench in the riprap area to help prevent migration of the product towards Hilliards Creek.
- Removal of the pump house and excavation of adjacent soils to remove a documented source of contaminated soil and potential pathway that was identified in previous investigations.

Investigation activities to identify possible causes for the release were also performed as part of the Expedia Notice Scope of Work (SOW). In 2003 and 2004, Sherwin-Williams conducted a geophysical investigation of the FMP to identify subsurface utilities, historic features and possible transport pathways for free product, and performed a soil screening and confirmatory sampling program to delineate the extent of the residual petroleum product present at the FMP. This subsurface characterization and investigation program was conducted to characterize the nature and extent of the residual petroleum product found in the Seep and Former Tank Farm A areas. This program, performed from September through December 2003, consisted of two phases, a preliminary characterization and soil screening survey, followed by a confirmatory Geoprobe® investigation coupled with collection of impacted soil/product samples for identification and characterization.

A detailed summary of previous investigation and interim remedial measures conducted under USEPA Removal Branch oversight is included in the FMP RIR (Weston, 2018).

<u>EPA Remediation Branch Oversight – Remedial Investigation/Feasibility Study Activities</u>

Sherwin-Williams continued operation of the SVE/FPR system in accordance with the prior requirements to recover additional product and minimize the potential for discharges to Hilliards Creek. The system operated on a full-time basis from November 1997 through December 2008, then on a reduced basis due to mechanical issues from December 2008 until June 2010. Operation of the SVE/FPR system was terminated in 2010 after several years of declining product recovery rates.

Monthly manual product recovery activities were initiated in March 2010, and have recently transitioned to quarterly recovery, except for Seep Area Location H-3P, which is also checked during June and July with recovery conducted as warranted. These manual product recovery activities consist of:

- Opening the wells and taking head space readings with a photoionization detector (PID).
- Measuring water and product levels at designated wells.
- At wells with recoverable product thicknesses, removing accumulated product with a peristaltic pump. Once the product is removed, the wells are allowed to recharge to determine if additional product accumulates. Once the product is reduced to a sheen, hydrophobic adsorbent socks are placed in the well.
- At wells where a sheen is observed but without a recoverable thickness of product, installing hydrophobic adsorbent socks.
- Sending all product, product/water mixture, and adsorbent socks off-site for disposal.

Sherwin-Williams continues to manually remove product from specified locations within the Seep Area on a regular basis and conducts routine gauging of water levels and product thickness. As a result of the actions that have been conducted, there have been no reported discharges of petroleum product from the Seep Area to Hilliards Creek since 2003.

2.3.2 Other Investigations

Groundwater investigation and monitoring well installation activities have been conducted over time with the most recent well installation activities completed in 2017. In conjunction with the well installation activities, both focused and routine groundwater gauging and sampling events have been conducted and this data has been used in the assessment. This historical record of groundwater gauging and sampling data along with the operational data for the FPR system have been leveraged in the development of the LNAPL conceptual understanding and used in the assessment of LNAPL mobility and recoverability at this Site.

In conjunction with these investigation and monitoring activities, focused LNAPL investigations have been historically conducted at the Site. These have included geophysical, MIP, LIF, and a shallow groundwater screening program. In the *Revised Work Plan for Additional Groundwater Characterization* (Sherwin-

Williams, 2012), as part of a Pilot Application of Innovative Site Characterization Technologies, Sherwin-Williams performed natural gamma downhole surveys (to refine the understanding of Site geology) and MIP and LIF technologies (combined with an electrical resistivity bench test) to assess the vertical and lateral extent of LNAPL and dissolved phase impacts.

Between June and September 2012, Sherwin-Williams also conducted a shallow and intermediate soil and groundwater screening investigation consisting of a series of borings that were installed across the FMP area to evaluate soil and groundwater conditions at depths corresponding to the top of the water table and at depths approximately 10 feet below the water table.

The investigation was conducted to better define the following:

- Vertical and horizontal extent of the residual LNAPL found in portions of the FMP
- Characteristics of the dissolved-phase constituents associated with residual LNAPL
- Need for, and locations of, additional shallow and intermediate groundwater monitoring wells

The shallow groundwater sampling program included both a soil sampling and groundwater sampling component. Two groundwater samples were generally collected at each location – approximately at the water table interface (the first 1.0 foot of the water table) and approximately at the 9.5 to 10.0-foot interval below the water table interface. Soil samples were collected at the interval 0.0 to 1.0 foot below the water table interface and at the 9.5 to 10.0-foot interval below the water table interface.

The objective of the intermediate groundwater sampling program was to investigate groundwater within the 20.0 feet below ground surface (bgs) to 45.0 feet bgs interval and evaluate the need for additional wells. The intermediate groundwater sampling program was conducted in the same manner as the shallow groundwater sampling program and included both a soil sampling and groundwater sampling component. Two groundwater samples were generally collected at each location – approximately 20 feet bgs (19.5 – 20.0 feet bgs) and approximately 30 feet bgs (29.5 – 30.0 feet bgs). At many locations, the approximate 19.5 – 20.0 feet bgs groundwater sample was not collected because the interval did not produce water. Soil samples were collected at the same intervals as the groundwater samples.

All soil and unfiltered groundwater samples were submitted for target compound list (TCL) VOCs, TCL semi-volatile compounds (SVOCs), and total organic carbon (TOC). The filtered groundwater samples were analyzed for TCL SVOCs and TOC. Soil samples were analyzed for total petroleum hydrocarbons (TPH) using NJDEP Method OQA-QAM-025-10/91.

The soils were screened for the presence of residual product-impacted soils or free-phase product (LNAPL) using a hydrophobic dye. Additional samples were collected in those locations where there was evidence of LNAPL (staining, free product, pigment, elevated PID readings) if that evidence was not found in one of the regularly-collected sample intervals.

A detailed summary of previous investigation and interim remedial measures conducted under USEPA Remediation Branch oversight is included in the FMP RIR (Weston, 2018).

2.4 Overview of LNAPL Impacts

Raw materials were previously stored in aboveground storage tanks (ASTs) and underground storage tanks (USTs) in two areas at the site, Former Tank Farm Areas A and B. Raw materials and finished goods were also stored in former buildings located at 1, 2, 4, and 5 Foster Avenue; and 6 East Clementon Road (Weston,

2004) (**Figure 2-1** and **Figure 2-2**). Based on the historical investigations, the following potential LNAPL source areas were identified:

- **Former Resin Plant and Material Storage Area**: This area is in the northern portion of the FMP, on the eastern side of Silver Lake and west of U.S. Avenue.
- **Former Tank Farm A**: The Former Tank Farm A area is in the northeastern portion of the FMP, along U.S. Avenue, and north of the 2 Foster Avenue and east of the 4 Foster Avenue.
- **Former Main Plant Area**: The Former Main Plant Area is generally the area north of Foster Avenue, south of Silver Lake, west of the 2 and 4 Foster Avenue and east of West Clementon Road.
- **Former Tank Farm B**: The Former Tank Farm B area is located south of Foster Avenue and west of Hilliards Creek.
- **Seep Area**: The Seep Area is the area south of Foster Avenue, west of U.S. Avenue and east of Hilliards Creek, and east of the 1 Foster Avenue and 5 Foster Avenue.
- **Former Pump House**: The Former Pump House is located southwest of the Seep Area at the eastern bank of Hilliards Creek.
- **Former Lagoon Area**: The Former Lagoon Area is located immediately south of the Seep Area and north of the Northern Bridgewood Lake Tract.
- **Former Service Station/Tavern**: The Former Service Station/Tavern is located on the southeast corner of U.S. Avenue and Berlin Road.

While LNAPL impact has been identified at these areas, the primary source areas for LNAPL impact in groundwater were identified around the Former Tank Farms A and B, Former Resin Plant and Material Storage Area, and Seep Area. For this LNAPL assessment, 11 study areas (A through K) were defined to capture each of the source areas identified above. These study areas are summarized below (**Table 2-1**) and shown on **Figure 2-2**:

Table 2-1: 2017 LNAPL Investigation Study Areas

2017 LNAPL Investigation Study Areas	Historical Site Areas
A, B	Former Tank Farm A
C, I	Former Main Plant Area
D	Former Resin Plant and Material Storage Area
E, F	Seep Area
G, H	U.S. Avenue / Eastern Off-Property Area
J	Former Service Station/Tavern
K	Hilliards Creek/Seep Area

2.5 Preliminary Site LNAPL Understanding

To support the development of the Work Plan, a preliminary LNAPL conceptualization was developed based on the historical investigations conducted at the Site. This assessment leveraged the more recent LNAPL investigations which focused on higher resolution lithology characterization and the delineation of LNAPL, soil, and groundwater impacts as well as routine groundwater monitoring, and LNAPL recovery data. Sherwin-Williams presented key findings from review of this information to USEPA on December 5, 2016. A copy of the December 5, 2016 presentation was included in the Work Plan (EHS Support, 2017). The key findings and conclusions regarding the controls on LNAPL mobility and recoverability are summarized below:

- LNAPL Physical and Chemical Properties – Physical sampling data indicate that the LNAPL at the FMP Site is generally classified as weathered mineral spirits, containing relatively minor proportions of aromatic constituents (e.g., benzene, toluene, ethylbenzene, and xylene [BTEX]) and tentatively identified compounds (TICs). The dominance of aliphatic (alkane) compounds, which are readily biodegraded, indicates that natural degradation could be a significant mass loss mechanism at this Site.

- Geology and Hydrogeology – Geophysical investigation data techniques used from 2012 to 2013 (MIP, LIF, electrical conductivity [EC], and natural gamma) indicate that soil heterogeneity is a major control on historical LNAPL migration and the current distribution, saturation, and mobility/recoverability of LNAPL. High proportions of fines may be present in the upper soil sequence with significant spatial variability observed across the Site. The nature of historical releases and presence of fine-grained intervals, combined with historical fluctuations of groundwater levels and regional hydrogeologic controls contributed to the residualization of LNAPL over a large extent, typically at and below the water table at the Site.
- LNAPL Distribution – Investigations have shown the presence of both residual and recoverable LNAPL. Field observations of LNAPL, soil data, and groundwater data indicate that residual, non-mobile LNAPL impacts are present across the site and extend from and downgradient of the former source release areas. LNAPL has historically been identified at a number of monitoring locations adjacent to Former Tank Farm A, the Seep Area, and the Former Service Station/Tavern. In these areas, there has been long-term stability in the observation of LNAPL in wells (with no new wells with LNAPL observations over the last 5 years), chemical constituent decreases since initial sampling in 1993, and the presence of methane at former source areas indicating LNAPL degradation.
- LNAPL Mobility and Recovery – The recovery data show the greatest LNAPL recovery volumes were observed either during periods of low groundwater elevations or after periods of large-scale changes in groundwater elevations. The current LNAPL recovery rates are small relative to historical recovery rates and indicate that the majority of LNAPL is present as residuals within the formation, with potentially drainable fractions at the pore scale limited to Tank Farm A, the Seep Area, and Former Service Station/Tavern.
- Natural Degradation – LNAPL degradation at the Site is supported by recent soil gas data, which indicates the presence of elevated methane concentrations in the subsurface, consistent with biological degradation processes (methanogenesis). Given the potential significance of degradation processes, supplemental data collection was conducted to better understand the fate and transport of LNAPL and dissolved phase constituents in groundwater.

Based on the assessment, it was determined that residual LNAPL is present at and below the groundwater table at the Site. The extent of LNAPL is primarily located at and immediately downgradient of the former source areas at the Site (Former Tank Farm A, Former Resin Plant and Material Storage Area, and Seep Area). Based upon this preliminary Site understanding of LNAPL conditions, additional data investigation was determined to be required to refine the understanding of LNAPL mobility, recoverability, its contributions to dissolved phase COPCs at the Site, and to ultimately answer the key data gap questions summarized in **Section 1.2**.

3.0 LNAPL FUNDAMENTALS

A discussion on the fundamentals of LNAPL is provided below. The characteristics of LNAPL type(s), the hydrogeologic conditions at the Site, and the manner in which LNAPL may have been released are the primary factors that influence the historical and current distribution and behavior of LNAPL in the subsurface. The following sections build on these fundamentals to interpret historical and recently-collected Site-specific data to refine the LNAPL conceptualization provided in **Section 2.5**.

3.1 LNAPL Physical Properties

Physical properties, such as viscosity, density, and LNAPL saturation, influence LNAPL mobility within the subsurface. Viscosity is an important limiting factor of LNAPL mobility because the higher the viscosity, the more internal resistance the LNAPL has to flow. Low viscosity LNAPLs, such as gasoline, will tend to flow readily given sufficient volumes and LNAPL gradients, while a high viscosity LNAPL such as crude oil, has very little migration potential despite the volume of the release, with migration only occurring during the initial release when LNAPL gradients are greatest.

As detailed by Higginbotham et al. (2003), viscosity has a major effect on LNAPL inherent mobility and recoverability. In general, Higginbotham et al. (2003) and other American Petroleum Institute (API) Research has demonstrated that only low viscosity products (diesel through gasoline) exhibit high inherent mobilities, which support potential recovery. Medium to high viscosity compounds (viscosities greater than 20 centistokes [cSt]) are effectively immobile and unrecoverable in most geologic settings. Crude oils and lube oils will exhibit limited to no mobility or recoverability. As viscosity of LNAPL increases (due to higher proportions of heavier crude oils and/or weathering) the potential for mobility decreases.

Density is another important physical property when evaluating LNAPL mobility, especially when LNAPL-groundwater interaction is of interest. Because LNAPL is lighter than water by definition, density is an important concept in understanding LNAPL buoyancy and associated interaction with groundwater in the saturated zone. LNAPLs with higher densities (approaching 0.94 for crude oils) also have a greater ability to displace water from pore spaces than low-density products, as they require lower heads to exert sufficient pressure to displace water from pore spaces.

Saturation is the third key property in understanding LNAPL mobility in the subsurface. As shown on **Figure 3-1**, saturation and LNAPL type (and viscosity) directly impact LNAPL conductivity, or the ability for the LNAPL to move within the subsurface. Unlike groundwater, which is implicitly known to be at 100 percent saturation within the saturated zone, LNAPL saturation never reaches 100 percent saturation in the subsurface and therefore saturation becomes a major limiting factor on LNAPL mobility.

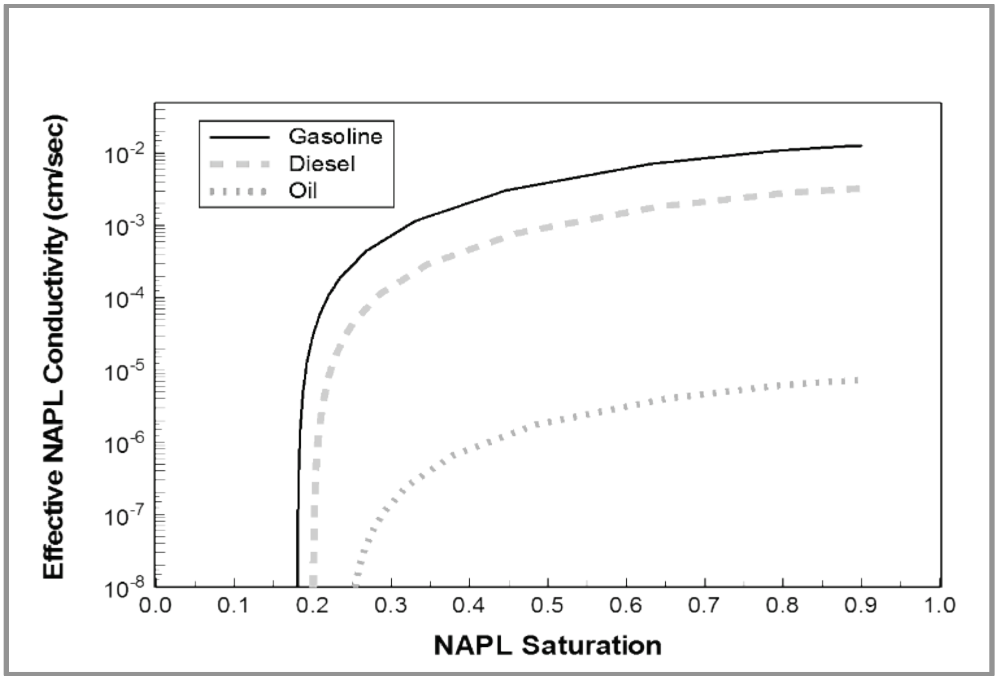


Figure 3-1: LNAPL Conductivity (reproduced from RTDF, 2005)

The concept of LNAPL saturation and its relationship to the aquifer properties is discussed further in the following sections.

3.2 Multiphase Interaction and LNAPL Saturation

LNAPL within the subsurface coexists as a multiphase system within the pore spaces in the formation, as shown in **Figure 3-2**.

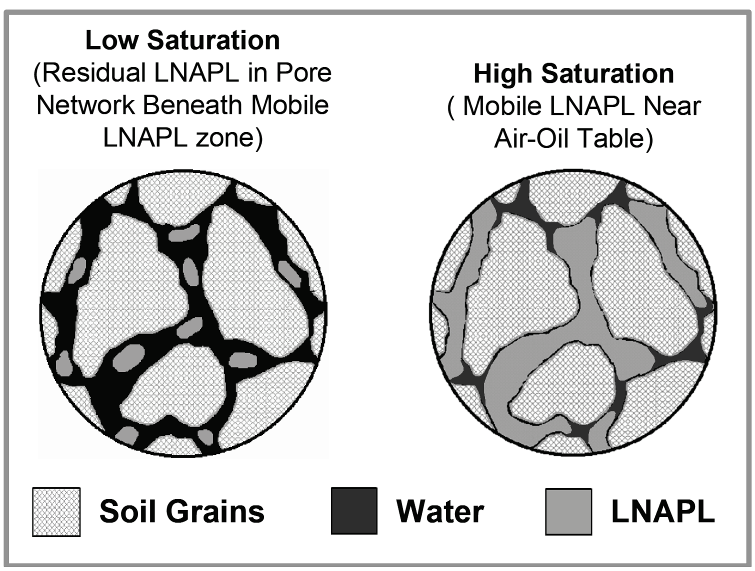


Figure 3-2: LNAPL Saturation (reproduced from API, 2006)

Within the vadose zone, the multiphase system consists of a mixture of LNAPL, air, and water. Beneath the water table, pore space is occupied by either LNAPL or water. LNAPL occurs as either residual or mobile LNAPL in this multiphase system. The term "residual" refers to LNAPL that is retained by soil/matrix capillary forces and/or is trapped within discontinuous pore spaces and thus is stuck within the formation. The residual saturation of LNAPL (the capacity of the soil/matrix to trap LNAPL) is dependent upon the pore throat size distribution, the nature of the LNAPL, the relationship between capillary forces and water content in the pore throats, and the movement of the LNAPL with respect to the water table.

Mobile LNAPL occurs when the LNAPL saturation is sufficient to create a continuous LNAPL phase between pores in the soil matrix by either occupying air-filled pore spaces within the vadose zone or displacing water-filled pores within the saturated zone. This mobile LNAPL volume has the potential to migrate vertically or laterally within the formation. Because sufficient LNAPL mass must be present to exceed internal and external controls on LNAPL mobility (e.g., LNAPL physical properties and aquifer properties) to overcome the residual saturation, LNAPL saturations are generally lower in the unsaturated zone, where pore space is occupied by LNAPL, air, and water, than in the saturated zone where only LNAPL and water fill the pore spaces (API, 2013).

It is important to note, that when LNAPL saturation exceeds residual levels, it only has the potential to move and redistribute through the pore network. However, this inherent mobility alone is not enough to cause movement of the LNAPL; an LNAPL gradient (or head) is required before migration can occur. In addition, there are a variety of resistant forces, such as capillary entry pressure (the pressures required to enter a pore space and displace air or water), that will further impede migration and stabilize LNAPL plumes. Typically, LNAPL plumes expand and migrate when LNAPL is first released into the subsurface, and continue to migrate as long as additional LNAPL is added to the plume. However, once the source is removed, the plume tends to stabilize rapidly with redistribution of LNAPL occurring primarily within the plume with little to no continued LNAPL plume expansion. This is consistent with the concepts presented in NJDEP's LNAPL guidance (NJDEP, 2012):

> "After the release has stopped, the spread of the LNAPL body is spatially limited by forces that counteract the force of the LNAPL gradient including LNAPL buoyancy and capillary forces. There are two general stages in the development of the LNAPL body at the saturated zone after a subsurface petroleum release: 1) the initial, shorter duration expansion stage when the LNAPL is actively migrating under a sufficient LNAPL gradient; and 2) a much longer duration stable stage when migration is minimal to nonexistent after the hydraulic forces driving LNAPL migration have diminished relative to counteracting forces (Minnesota 2010). However, if there are changes in these forces, such as water table elevation or gradient changes, LNAPL plume stability can change both horizontally and vertically. Because petroleum is immiscible in water, it will persist in a separate phase in the pores within the saturated zone after the LNAPL body is spatially stable."

In contrast to the multiphase concept described above, historically the vertical distribution of LNAPL at the water table was based on the idea that LNAPL occurs as a distinct lens in which the drainable pore space is completely saturated with LNAPL. This was often referred to as the "pancake layer" conceptualization where LNAPL was present at 100 percent pore volume saturation within specific intervals. This conceptualization predicted large free LNAPL volumes, high mobilities, and large recoverable volumes and did not consider soil or LNAPL properties, which could inhibit mobility and recoverability (RTDF, 2005). This historical conceptualization of LNAPL has led to gross overestimates of LNAPL mobility and recoverability and has been proven to be highly inaccurate and unrepresentative of Site conditions.

3.3 LNAPL Migration and Residualization

For the purpose of further discussion, a surface or near surface release of LNAPL is considered, as shown in **Figure 3-3**.

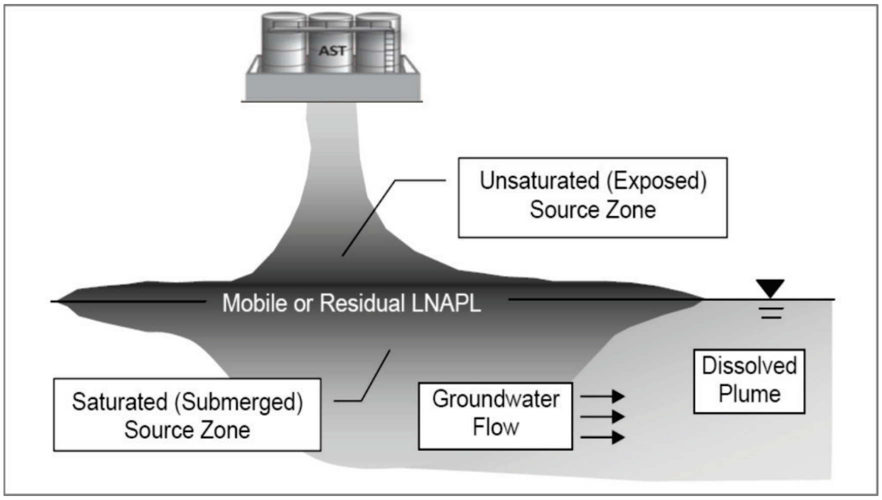


Figure 3-3: LNAPL Migration and Distribution (modified from ITRC, 2009a)

When LNAPL is released at the surface, LNAPL migrates vertically downward under the force of gravity. The dynamic and heterogeneous character of the subsurface influences LNAPL conditions and allows for preferential flow and inhibition of LNAPL migration. As shown in **Figure 3-4**, mobile LNAPL will tend to migrate in more permeable and porous soils (as a result of higher LNAPL conductivity). LNAPL migration is preferentially confined to the intervals of higher LNAPL intrinsic permeabilities where the LNAPL heads required to displace groundwater (pore entry pressures) are lowest. In these high-permeability zones, the migration of LNAPL is ultimately controlled by the continuity of these units, with low-permeability units, which interrupt the coarse-grained units acting as “stratigraphic traps” or low-permeability dikes, which limit or prevent further migration of the LNAPL.

In addition, **Figure 3-4** shows the impact of changes in grain size on LNAPL transmissivity. Minor changes in grain size for example, from fine/medium sand to silty sand, results in major changes in LNAPL transmissivity. The presence of fines with the pore throats of a coarse-grained matrix results in major reductions in pore throat diameters which impedes both the ability of LNAPL to enter a pore space and displace water (pore entry pressures) and also move through LNAPL filled pore spaces. In this context small changes in grain size distributions (and associated average pore throat diameters) can have major impacts on LNAPL mobility and recoverability.

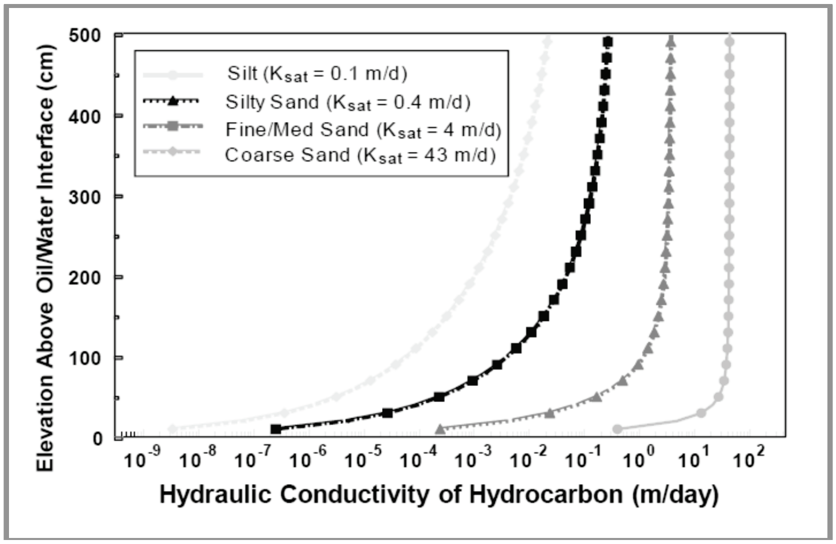


Figure 3-4: LNAPL Permeabilities (reproduced from RTDF, 2005)

Due to capillary forces, some LNAPL will always be retained in the pore spaces as residual LNAPL, as described above. As the LNAPL moves through the subsurface, portions of the LNAPL become trapped (residualized) within the soil pore structure, with LNAPL of a finite volume migrating until it is effectively all trapped as residual in the formation.

When the volume of the release is sufficient to overcome the controls on LNAPL mobility, the LNAPL migrates through the unsaturated zone to the capillary fringe and water table. Once at the capillary fringe, the increasing water content, and the effects of LNAPL buoyancy impede the vertical movement of the LNAPL near the water table, and, with LNAPL being less dense than water, LNAPL begins to migrate laterally along the water table. If releases are ongoing, LNAPL migration will continue in response to the LNAPL heads in the system. Termination of the release results in dissipation of LNAPL heads (via lateral migration) and ultimately termination of LNAPL migration and stabilization of the LNAPL plume.

In general, the lateral LNAPL migration reflects the groundwater gradients and flow regime at the Site. However, if the rate of downward vertical LNAPL movement from surface exceeds the lateral migration, LNAPL will mound, displacing water from the aquifer pore spaces below the water table and flow can become somewhat radial. This radial flow concept is evident mostly in low-permeability formations where LNAPL flow is limited by the finite number and conductivity of fractures. Other key phenomena that can be observed where LNAPL migration is impeded and higher LNAPL heads develop include:

1. Vertical migration of LNAPL to depth and additional displacement of water from pore spaces.
2. Vertical migration of LNAPL below the water table and migration of LNAPL in more transmissive zone within the saturated zone.
3. Entry of LNAPL into more fine-grained units at or above the water table.

Because residual LNAPL saturation limits vary above and below the water table, LNAPL is significantly influenced by vertical fluctuations in the water table. Vertical water table fluctuations produce unique conditions where LNAPL becomes trapped or released from the pore network due to the location of the water table and, as a result, the vertical movement of the groundwater table affects the volume of mobile and residual LNAPL as illustrated on the schematic below.

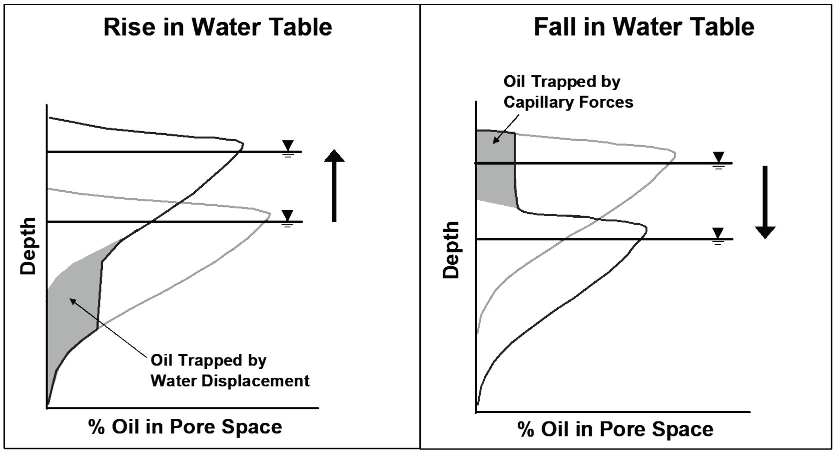


Figure 3-5: LNAPL Residualization (reproduced from API, 2006)

The resultant vertical movement of the water table can produce a residual smear zone within the saturated and unsaturated zone. Based on the geologic setting, this can result in the following relationships between water elevation and LNAPL thickness:

1. Inverse relationships between groundwater elevations and LNAPL thickness where falling water levels result in drainage of LNAPL from deeper portions of the formation and their accumulation within wells. This phenomenon is typically observed in unconfined conditions with limited transmissivity contrasts with depth.
2. Increases in LNAPL thicknesses with increasing water levels. This is observed where the LNAPL is contained within a highly transmissive unit, which becomes confined below a lower permeability unit resulting in up filling of LNAPL into the well and in some cases migration of LNAPL to a stratigraphic high in the contact between the coarse and fine-grained units.

In general, LNAPL thicknesses observed in monitoring wells situated within an unconfined aquifer will increase when water levels fall and will decrease or in some cases may totally disappear when water levels rise. This effect is generally more pronounced in coarser soils and sites with large water table fluctuations. These fluctuations result in vertical redistribution of LNAPL within the subsurface, which affect the mobility and, ultimately, the residualization of LNAPL.

3.4 LNAPL Transmissivity, Mobility, and Recoverability

A fundamental nuance of multiphase flow is that the effective conductivity of LNAPL strongly diminishes as the LNAPL saturation decreases. Therefore, two key factors to LNAPL migration, LNAPL gradient and saturation, diminish through time (through residualization and mass loss processes) and result in exponential decreases in the ability for LNAPL to move through an aquifer. The ability for LNAPL to move through a cross-sectional area of an aquifer is described as LNAPL transmissivity. Generally, the higher the transmissivity value, the greater the LNAPL saturation and therefore the greater the potential for mobile LNAPL to be present within the formation. The equation to calculate LNAPL transmissivity is provided below:

$$T_n = K_n * b_n$$

Where:
T_n = LNAPL Transmissivity
K_n = LNAPL conductivity
b_n = LNAPL thickness under vertical equilibrium

However, as discussed earlier, the effective conductivity of LNAPL is a function of saturation and therefore varies throughout an LNAPL plume where saturations decrease with distance from the source of the release. In practice, LNAPL transmissivity values are often derived from baildown test results from wells within the center of the plume where sufficient LNAPL is present within a monitoring well. Although these results can reasonably estimate the LNAPL transmissivity values in the plume center, transmissivity values are not uniform across a plume area and decrease rapidly with distance from the source (as LNAPL saturations decrease).

Consistent with the multiphase principles discussed above, the highest transmissivities are typically observed in coarse-grained soils with the highest LNAPL saturations. Finer grained soils (silts and clays) typically need high LNAPL saturations before any measurable LNAPL mobility and recoverability is observed. High LNAPL saturations in fine-grained soils are typically only observed in areas near the release area where LNAPL heads were sufficient to displace water from pores spaces and facilitate high LNAPL saturations.

Based on the principles discussed above, it follows that in homogeneous soils, the greatest LNAPL recoveries are possible in the center of the plumes where thickness, saturations, and pore-scale mobility are highest. Towards the edges of the plumes, saturations decrease to below residual concentrations, pore entry pressures resist the penetration of more LNAPL, and hydraulic recovery becomes inefficient and ineffective. In more heterogeneous soils, the differences in soil properties (grain size and percent fines) in combination with saturations further reduce the mobility and recoverability of LNAPL.

An evaluation of recovery case studies conducted by Beckett and Huntley (2000) determined that total LNAPL recovery was typically less than 30 percent of the original volume in place consistent with the theory described above. In finer-grained materials, recovery of more than 15 percent of the LNAPL in place would be unusual. This is consistent with oil industry experience where extensive effort has been expended to recover oil from the ground in conditions more conducive to recovery (fractured rock and confined reservoirs). Studies of oil reservoir rocks have shown residual oil left behind at the conclusion of water flooding typically ranges from 25 to 50 percent of the pore volume (Chatzis et al., 1993; Melrose and Brandner, 1974).

3.5 LNAPL Phase Partitioning

Just as LNAPL physical properties and aquifer properties are central to LNAPL distribution, mobility, and residualization, LNAPL chemical composition is central to how constituents within the LNAPL will interact with other media such as soil vapor, groundwater, and soil. The following discusses how LNAPL chemistry controls the resultant partitioning into other media (also known as phases) and how threshold concentrations within the various media can be calculated to support investigative and remedial decision-making.

3.5.1 Vapor Phase

Because LNAPL is often comprised of volatile constituents at relatively high concentrations compared to soil and groundwater, evaluating the maximum potential soil gas concentration of a particular constituent within LNAPL is important in evaluating vapor intrusion risks.

The maximum potential soil gas concentration of a constituent is a function of the constituent's vapor pressure and mole fraction within the LNAPL mass as given by Raoult's Law for ideal gas mixtures:

$$Csg = xi\ vpi\ MWi / RT$$

Where:
Csg = maximum potential soil gas concentration of the constituent "i"
xi = mole fraction of constituent "i" in the LNAPL
vpi = vapor pressure of constituent "i" in the LNAPL
MWi = molecular weight of constituent "i"
R = Ideal Gas Constant
T = temperature

This relationship is important because it demonstrates that the mole fraction of the constituent within the LNAPL is a key control on the potential soil gas concentrations observed above a LNAPL source. For example, higher mole fractions of LNAPL constituents (e.g., ethylbenzene and xylenes) result in higher equilibrium concentrations in the vapor phase above the LNAPL.

These relationships can be used to evaluate mass loss of various constituents within the LNAPL through volatilization and the potential risks associated with flux from LNAPL into a vapor phase. In addition, it can also provide a metric for establishing practical endpoints for SVE efforts.

Consistent with these principles, it is important to recognize that as the mole fraction of volatile constituents declines over time (either through operation of the SVE system or natural mass losses), the flux of constituents from LNAPL into vapor phases will decrease (reducing the efficiency of further active extraction), and potential sub slab vapor concentrations and vapor intrusion risks will also decline.

3.5.2 Aqueous Phase

In order for constituents within LNAPL to act as a potential source of impacts to groundwater, the constituents must partition into the aqueous phase. Aqueous concentrations of constituents in the LNAPL are dependent upon the aqueous solubility of each constituent in the LNAPL and the relative mass of each constituent in the LNAPL. The relationship between aqueous solubility of a constituent and its concentration within the LNAPL is analogous to Raoult's law for ideal gas mixtures. For LNAPL in contact with water, the aqueous phase concentration of an LNAPL constituent is equal to the aqueous solubility of the constituent multiplied by the mole fraction of the constituent within the LNAPL mixture. This relationship can be written as:

$$C_w^i = x_i S_i$$

Where:
$C_w^i =$ effective aqueous solubility of the constituent "i"
$x_i =$ mole fraction of constituent "i" in the LNAPL
$S_i =$ aqueous solubility of pure constituent in water

Similar to vapor phase partitioning, the mole fraction of a constituent in LNAPL (relative to the total composition of the LNAPL) becomes a major limiting factor on the maximum potential constituent concentration in pore water in contact with LNAPL. For example, a constituent with a pure phase aqueous solubility of 1,000 milligrams per Liter (mg/L) that has a mole fraction of 0.5 (close to 50 percent of the entire LNAPL composition) will have an effective solubility (maximum potential aqueous concentration) of 500 mg/L. This same constituent with a mole fraction of 0.05 of the LNAPL will only have an effective solubility of 50 mg/L. This concept illustrates the importance of understanding the composition of the LNAPL in order to evaluate its potential as a continuing source to groundwater.

The actual dissolved concentrations measured in groundwater monitoring wells will be lower than the effective solubility due to a combination of processes including:

- Not all groundwater has been in direct contact with LNAPL and as a result, groundwater concentrations are diluted by groundwater that has not been in contact with LNAPL.
- Natural mass loss mechanisms (biodegradation and sorption), which occurs within the saturated zone.

Where groundwater concentrations measured in the wells are close to or above the effective solubility of the LNAPL, the data is a strong indicator that LNAPL and/or sheens were sampled and that LNAPL is present within the aquifer matrix in close proximity to the well.

3.5.3 Sorbed Phase

LNAPL composition also has a significant impact on the soil saturation limit of a given constituent, or the concentration at which LNAPL begins to form (USEPA, 1996). For a given constituent within soil, the maximum soil concentration before LNAPL begins to form is given by:

$$C_{sat} = \frac{S}{\rho_b}\left(K_d\,\rho_b + \theta_w + H'\,\theta_a\right)$$

Where:
C_{sat} = Soil Saturation Limit
S = Pure Phase Aqueous Solubility
ρ_b = Dry Soil Bulk Density
K_d = Soil Distribution Coefficient
θ_w = Volumetric Water Content
θ_a = Volumetric Air Content
H' = Henry's Law Constant

When evaluating saturated soils, the equation is modified to:

$$C_{sat} = S(K_d + \frac{\theta_g}{\rho_w})$$

Where:
θg = Gravimetric Water Content
ρ_w = Water Density

It is important to note however, that the modified equation above is applicable to a simplified case where the maximum groundwater concentration is equal to the pure-phase solubility. Because LNAPL at the Site is a mixture of various constituents, the maximum theoretical groundwater concentration is equal to the effective solubility (which is always lower than the pure-phase solubility). Therefore, to calculate Site-specific C_{sat} values the equation above is modified as follows for the saturated zone:

$$C_{esat} = C_w(K_d + \frac{\theta_g}{\rho_w})$$

Where:
C_{esat} = Effective soil saturation limit
C_w = Effective solubility

Where soil concentrations are close to or above the effective soil saturation limit, the data are a strong indicator that LNAPL was sampled and/or is immediately adjacent to a sampling interval. Therefore, soil concentrations exceeding effective soil saturation limits are central in identifying the extent of LNAPL within the subsurface.

It should be noted that while the soil saturation limit (C_{sat}) reflects the threshold where residual LNAPL may be present in pore spaces in the soil, it is not reflective of the threshold above which LNAPL may be mobile (i.e., the residual LNAPLNAPL concentration limit or C_{res}). Brost et al. (2000) completed an assessment of LNAPL saturations in soil and provided soil and LNAPL specific values for C_{sat} and C_{res} for petroleum hydrocarbon mixtures. Brost noted that many organic chemicals, including hydrocarbons, are nearly immiscible in water (pp.1) with C_{sat} providing a threshold above which LNAPL is present within the soil column and C_{res} providing a threshold above which potential LNAPL mobility and recoverability can occur.

From the assessment provided, Brost et al. (2000) estimated C_{res} and C_{sat} for a variety of soil and product types. In addition, Brost et al. (2000) provided the following equation to calculate site-specific C_{res} values:

$$C_{res,soil} = \left(\frac{\theta_o \cdot \rho_o}{\rho_s} \right) \cdot 10^6 \ \frac{mg}{kg}$$

Where:
$C_{res,soil}$ = Residual LNAPL concentration in soil (mg-res/kg-soil)
$\theta_o = \eta \times Sr$ = Residual LNAPL volume fraction (cm3-res/cm3-soil)
ρ_o = Density of LNAPL (g-res/cm3-res)
ρ_s = Dry soil bulk density (g-soil/cm3-soil)

Therefore, C_{sat} calculations serve as an important line of evidence in defining LNAPL extent and C_{res} provides a line of evidence to determining whether LNAPL is potentially mobile or present in a residual state.

4.0 INVESTIGATION METHODOLOGY

Investigation activities were conducted iteratively in accordance with the scope of work described in the Work Plan. The field activities for this LNAPL investigation were conducted by EHS Support with support by Weston. The following sections provide a detailed description of the methodologies used to complete the investigation work programs. The investigation focused on the following key characterization activities:

- **Section 4.1 – Field Preparation and Site Management**: Pre-field planning, permitting (including the site-wide subsurface boring permit and right-of-way street encroachment permits), health and safety, boring mark-out and utility clearance, decontamination, sample custody and handling, and waste management.
- **Section 4.2 – CPT/MIP Characterization Program**: High resolution understanding of the fine-grained soil lithology and chemical impact response.
- **Section 4.3 – Conventional Drilling Program**: Further assessment of soil stratigraphy, chemical concentrations, physical properties of soil, and petrophysical properties of the LNAPL to better understand the LNAPL mechanics, contaminant mass distribution, and fate and transport processes.
- **Section 4.4 – LNAPL Testing Program**: LNAPL baildown and stress testing, and LNAPL composite sampling performed to calculate LNAPL transmissivity values, determine the chemical composition, and assess recoverability.
- **Section 4.5 – Natural Degradation Testing Program**: Further assessment of water quality to assess LNAPL source depletion, natural mass losses, and biodegradation of LNAPL constituents.
- **Section 4.6 – Quality Assurance and Quality Control:** Quality control of data obtained during investigation activities.
- **Section 4.7 – Variances and Deviations:** A summary of investigation variances and deviations from the Work Plan are summarized.

4.1 Field Preparation and Site Management

4.1.1 Health and Safety

The Weston Health and Safety Plan (HASP) (Weston, 2016a) included a summary of monitoring procedures and protocols associated with fieldwork activities. The HASP required personnel working on project-related field tasks to be trained in accordance with Occupational Safety and Health Administration (OSHA) regulations and provided guidance for safely executing fieldwork tasks. Prior to initiating field work activities, the HASP was reviewed to ensure coverage of all investigation field tasks included as part of this LNAPL investigation. A copy of the HASP was kept on-site during all fieldwork activities and was reviewed by the field staff prior to daily work activities.

4.1.2 Permitting

Prior to soil coring activities, a site-wide drilling permit (#E20170063) for the CPT/MIP locations was obtained by the drilling contractor (Conetec Inc. [Conetec]) from the NJDEP Bureau of Water Allocation and Well Permitting. A copy of the site-wide permit is included in **Appendix A**.

An encroachment permit from the Camden County Highway Department (#A-39604) on September 14, 2017 for soil core locations DP-13 and D-14 located in Foster Avenue. A copy of the permit is included in **Appendix A**.

4.1.3 Boring Mark-out and Utility Clearance

Soil boring locations were reviewed by Weston, EHS Support, and the drilling subcontractors (East Coast Drilling Inc. [ECDI] and Conetec) personnel prior to conducting work to ensure accessibility by the drill rigs prior to field mobilization. Access requirements and notifications were conducted by Sherwin-Williams and Weston in conjunction with these tasks.

Utility clearances were performed under the supervision of Weston at areas where intrusive activities were to be completed. New Jersey "One Call" was contacted by Weston for borings DP-1 to DP-7. EHS Support contacted New Jersey "One Call" on September 6, 2017 for borings DP-8 to DP-24 and the CPT/MIP locations (Request No. 172492853) to request utility mark-out at the boring locations. A private locating service company (GeoGraf) was mobilized to the areas of proposed intrusive activities and a survey was conducted to determine the location of underground public, private, and unknown utilities. GeoGraf used ground penetrating radar (GPR), electromagnetic conductivity (EMC), and radio frequency (RF) methods to survey for potential subsurface obstructions prior to the commencement of any subsurface work. Where identified or suspected subsurface utilities were observed by the survey, the subsurface boring location was moved up to 3 feet from its proposed location. The soil core and CPT/MIP boring locations are shown on **Figure 4-1**.

4.1.4 Equipment Decontamination

Decontamination Standard Operation Procedures (SOPs) specified in the Work Plan were followed throughout the investigation for equipment exposed to soil, groundwater, or LNAPL at the Site. A two-bucket method and distilled water final rinse was used for all field monitoring equipment. Water was changed on an as-needed basis determined by the field team, or daily at a minimum. The decontamination system consisted of the following:

- First bucket – potable water with non-phosphate lab grade detergent (Alconox® or Liquinox®, or equivalent) and a brush for scrubbing.
- Second bucket – only potable water for rinsing of equipment after the first bucket.
- Final rinse – involved pouring distilled water over the equipment after the second bucket rinse.
- Allow equipment to air dry in an area free from contact with contaminants.

Water was changed on an as-needed basis determined by the field team, or daily at a minimum. Decontamination water waste was managed as described in **Section 4.1.6**. Drill rig and downhole tooling used during the investigation were decontaminated using a pressure washer.

4.1.5 Sample Custody and Handling

Supplies, coolers, samples, and field equipment were stored at the Weston field office. The groundwater sample containers were bubble-wrapped and double-bagged with Ziploc® bags and placed in a cooler with ice for preservation. Ice levels were monitored and refreshed as necessary with samples routinely shipped or hand delivered under chain-of-custody procedures to the relevant laboratory.

Soil samples were contained in acetate sleeve liners and capped with Teflon™ tape and plastic end caps. The sample liners were then immediately frozen by placing the sample liners in a cooler with dry ice. The soil sample coolers were then shipped under chain-of-custody procedures by overnight delivery to PTS Laboratories (PTS) in Houston, Texas.

All standard chemical analysis samples (constituent concentrations and MNA parameters) were submitted to TestAmerica Laboratories, Inc (TestAmerica). Petrophysical samples were submitted to PTS. The microbial species QuantArray–Petro Suite samples were shipped under chain-of-custody procedures by overnight delivery to Microbial Insights in Knoxville, Tennessee.

4.1.6 Investigation Waste Management

Investigation-derived wastes (IDW) generated during the field operations were managed by Weston personnel. All IDW including soil cuttings, monitoring well purge water, unused samples, decontamination wash/rinse water, contaminated personal protective clothing, debris, and expendables generated on-site during the field investigations were containerized in Department of Transportation (DOT) approved 55-gallon steel drums, properly labeled, and shipped off-site to a licensed treatment, storage, and disposal facility (TSDF) for disposal in accordance with the prevailing regulations and Weston's SOPs for Waste Management and Disposal of Drums.

4.2 CPT/MIP Characterization Program

Conetec was retained to complete the CPT/MIP investigation at historical LNAPL impact areas (Former Tank Farm A, Former Resin Plant and Material Storage Area, and Former Main Plant) and in the downgradient direction (U.S. Avenue, Seep Area, the Former Service Station/Tavern, and near Hilliards Creek). The CPT/MIP characterization program was conducted to assess the fine-grained lithology across the Site to better understand the lithologic controls on LNAPL distribution and occurrence and to assess the vertical distribution of LNAPL.

Thirty-five (35) CPT/MIP boring locations within 10 areas of interest (A through G, and I through K; see Figure 4-1) were advanced between September 19 and 29, 2017. No CPT/MIP locations were advanced in Area H due to property access limitations. One CPT/MIP location (CPT/MIP-31) in Area J was not installed based on the limited access time available in that Area. The CPT/MIP borings were advanced from peripheral areas towards the perceived former source areas to minimize the potential for cross contamination. The depths of the CPT/MIP locations were based on MIP responses and generally advanced until responses returned to background levels. The depth of the CPT/MIP borings ranged from approximately 20 to 70 feet bgs. Once the target depth was reached, the CPT/MIP boring was grouted as soon as possible following retraction of rods to prevent potential downward contaminant migration. Borings were backfilled by using a Portland cement and bentonite slurry that was tremie grouted into the borehole, or bentonite chips were installed in boring less than 15 feet bgs. The ground surface was repaired to match the pre-existing condition. The CPT/MIP data report includes borehole lithology, CPT friction ratios, pore entry pressure measurements, and PID/flame ionization detector (FID) screening measurements. The CPT/MIP data is presented in graphical and electronic formats within the summary report included in **Appendix B**.

CPT/MIP investigation areas, boring locations, borehole depths, and co-located conventional boring locations are summarized in **Table 4-1**. The investigation areas and CPT/MIP boring locations for areas A through G, and I through K are shown on **Figure 4-1**. Example figures summarizing CPT and MIP data log information and interpretations are provided as **Figure 4-2** and **Figure 4-3,** respectively.

4.3 Conventional Drilling Program

The conventional drilling program (soil core and sample collection) was conducted by installing soil boreholes adjacent to a subset of CPT/MIP locations and conducting soil analytical testing to validate the data collected from the CPT/MIP program and further assess LNAPL distribution and potential mobility. ECDI was retained to complete soil core sampling during two mobilization phases (Phase I and Phase II) to accommodate specified access periods for off-site residential properties. An EHS Support licensed geologist provided oversight of ECDI during the two mobilization phases that included the following borings and work activities:

- Phase I: Included completion of soil cores DP-01 through DP-07 in Area H on July 12 and 13, 2017.
- Phase II: Included completion of soil cores DP-08 through DP-24 from Areas A to G, and I to K; and TOC and fraction of organic carbon (foc) sample collection from soil borings FOC-01 and FOC-02 from September 25 to 29, 2017. The FOC-01 and FOC-02 borings were advanced for collection of analytical samples only and were not field logged.

The 24 soil cores (DP-01 to DP-24) and two (2) TOC/foc soil borings (FOC-01 and FOC-02) were completed by ECDI consistent with drilling SOPs included in the Work Plan. Based on the CPT/MIP results, the soil core depths for DP-01 to DP-24 ranged from 10 feet bgs to a maximum depth of 45 feet bgs and extended below the intervals of LNAPL impact. The investigation areas, soil core borehole locations, borehole depths, and the co-located CPT/MIP locations (where present) are summarized in **Table 4-2**. The soil core locations are shown on **Figure 4-1**.

Soil cores DP-01 to DP-24 were completed using the Geoprobe® Direct Push Dual Tube sampler equipped with acetate sleeves to prevent potential downward migration of contaminants and minimize slough from entering the borehole. After collection from the boring, the DP-01 to DP-24 soil cores were immediately frozen in the field with dry ice to preserve pore fluids and facilitate petrophysical testing representative of in-situ conditions. The entire soil cores were then submitted under chain-of-custody procedures to PTS for future soil logging and petrophysical and chemical sub-sampling. Sample chain-of-custody documentation sheets are included in the lab reports in **Appendix C**.

Soil borings FOC-01 and FOC-02 were completed by similar direct push methods as the other soil borings at background locations hydraulically upgradient of known petroleum hydrocarbon impacts. Samples were selected to represent intervals approximately 2 feet above first-encountered groundwater and approximately 5 feet below groundwater.

Soil boring FOC-01 was advanced to 20 feet bgs with saturated soil encountered at approximately 9 feet bgs and 12.5 feet bgs; therefore, three samples were collected for laboratory analysis at 7.5 to 8 feet bgs (based on available soil recovery), 14 to 14.5 feet bgs, and 18 to 18.5 feet bgs. Soil boring FOC-02 was advanced to 20 feet bgs with saturated soil encountered at approximately 14 feet bgs. Two samples were collected from FOC-02 at 11.5 to 12 feet bgs and 19 to 19.5 feet bgs.

The soil samples were submitted to TestAmerica in Edison, New Jersey for laboratory analysis of foc by the Walkley Black Method. Sample chain-of-custody documentation sheets are included in the soil laboratory analytical reports in **Appendix D**.

4.3.1 Core Analysis and Laboratory Testing Program

The soil cores from the Site areas were submitted to PTS for photography and petrophysical testing. The soil cores were maintained frozen during the testing program. Additional soil samples were also sub-sampled from the selected cores for chemical analysis and submitted to TestAmerica. Chemical sub-samples were collected to minimize the loss of organic volatiles and were transferred to TestAmerica at analysis-required temperatures.

At PTS, the frozen cores were initially cut lengthwise (along the long axis of the core). Two-thirds of the core was photographed in the laboratory under white light and ultraviolet (UV) light and the other core portion was disposed properly. The photographed section of core was later logged at PTS by EHS Support from November 1 to 8, 2017 using the Unified Soil Classification System (USCS). Soil samples were also measured for VOC headspace vapors using a PID and soil characteristics (e.g., moisture content, consistency, odor, color), soil type, and sample recovery (length recovered/length pushed) were recorded on the logs.

DP-01 to DP-24 soil core intervals selected for both petrophysical and chemical laboratory testing were based on soil core observations that included:

- MIP response in the soil cores
- Soil VOC headspace vapor measurements
- Zones that were visually saturated with LNAPL
- Zones that were potentially transmissive or confining for LNAPL transport
- Zones overlying or underlying observed LNAPL-impacted soils

Discrete intervals of the preserved soil core were selected for petrophysical analyses as follows:

- **Initial Testing Program**
  - o Pore Fluid Saturation Testing Package (Dean Stark Method [API RP40]). This testing includes the analysis of initial fluid saturations (water and LNAPL), moisture content, total porosity, grain density, bulk density, and air-filled porosity.
  - o Grain size analysis by method American Society of Testing Materials (ASTM) D4464M (laser method).
- **Advanced Mobility Testing Program**
  - o Select samples (based on the results from the Initial Testing Program) were analyzed for the following additional petrophysical analyses:
  - o Air/Water Displacing Oil Imbibition Tests: This testing evaluates changes in pore fluid saturation in response to increased water pressures and can be used to simulate LNAPL recovery under a range of scenarios.
  - o Effective (drainage) porosity by method API RP40 – Modified ASTM D425.

These tests and their resulting data were used to evaluate the vertical and lateral variability in LNAPL saturations. A summary of the selected soil samples for the initial testing program and advanced mobility testing programs and screening results are included in **Table 4-3**.

4.3.2 Chemical Sample Analysis

Based on results from the co-located CPT/MIP responses and soil screening observations, core photography, and detailed core logging, soil samples were selected for chemical analysis and submitted to TestAmerica in Burlington, Vermont at analysis-required temperatures for the following suite of analyses to aid in the quantification of contaminant mass distribution:

- Massachusetts Department of Environmental Protection (MADEP) volatile petroleum hydrocarbons (VPH) (including BTEX and naphthalene)
- NJDEP extractable petroleum hydrocarbons (EPH)
- USEPA Contract Laboratory Program (CLP) Method SOM02.3 (trace and low/medium VOC including TICs)
- USEPA CLP Method SOM02.3 SOM02.1 (SVOC and TICs)

The sub-samples were collected by protocols and SOPs included in the Work Plan. Soil samples selected for volatile analysis (VPH and VOC) were preserved per the USEPA 5035 preservation method (using Encores). SVOC and EPH soil samples were contained in laboratory-provided sample jars. A summary of the selected soil samples for chemical sample testing program is included as **Table 4-4**. Laboratory chain-of-custody documents were completed by field personnel and are included within the laboratory analytical reports in **Appendix D.**

4.3.3 Boring Survey

Soil boring locations (including the CPT/MIP borings, direct push soil core borings, and foc sample borings) were surveyed for latitude, longitude, and elevation on December 12, 2017 by DPK Consulting, LLC (DPK) of Piscataway, New Jersey. Only DP-05 could not be surveyed by DPK due to limited property access. The DP-05 location was surveyed by using a hand-held global positioning system (GPS) unit by Weston personnel during the day of boring advancement. The DPK survey data report is included in **Appendix E.**

4.4 LNAPL Testing Program

4.4.1 LNAPL Baildown Testing

LNAPL baildown testing was completed on August 22, 2017 and August 23, 2017 to assess LNAPL transmissivity and potential recoverability. The Work Plan proposed performing baildown tests on one or more wells containing sufficient (approaching 0.5 feet or more) LNAPL thicknesses. The following wells were gauged for depth to groundwater and depth to product to determine which wells would be most appropriate for baildown testing (see **Table 4-5**).

Table 4-5: Summary of Groundwater Gauging Information (August 22, 2017)

<table>
<tr><th>Well ID</th><th>Depth to LNAPL (btic)</th><th>Depth to Water (btic)</th><th>Notes</th></tr>
<tr><td>MW-11</td><td>10.36</td><td>10.51</td><td>Bail down testing conducted on this well despite insufficient volume.</td></tr>
<tr><td>MW-26</td><td>No measurable LNAPL</td><td>13.26</td><td>Insufficient volume to support bail down testing.</td></tr>
<tr><td>MW-27</td><td>13.78</td><td>14.03</td><td>LNAPL measurement related to rust in well and not interpreted as indicative of true LNAPL thickness.</td></tr>
<tr><td>MW-13R</td><td>6.38</td><td>6.39</td><td rowspan="3">Insufficient volume to support bail down testing.</td></tr>
<tr><td>MW-21</td><td>7.08</td><td>7.10</td></tr>
<tr><td>H-3P</td><td>6.79</td><td>7.02</td></tr>
</table>

Notes:
*btic indicates below top of inner casing of the well.
LNAPL = liquid non-aqueous phase liquid

Based on the gauging results, LNAPL baildown testing was performed by EHS Support and Weston at well MW-11 on August 22, 2017. The LNAPL baildown testing was conducted per ASTM E2856, as referenced in the SOP included in the Work Plan. LNAPL was removed from the well using a peristaltic pump and dedicated tubing. After recovering approximately 390 milliliters of LNAPL and transferring it to a sample container, the well was manually monitored for groundwater and non-aqueous phase liquid (NAPL) recovery. Recovery was monitored every 10 seconds for 10 minutes, after every minute for 20 minutes, after every 10 minutes for 60 minutes, and then after approximately every 30 minutes until recovery was complete. Field notes documenting the field activities and recovery measurements are included in **Appendix F**. An evaluation of the baildown test of MW-11 is included in **Section 7.2**.

4.4.2 MW-11 Stress Test

Due to the limited LNAPL thickness and the lack of LNAPL recovery during the baildown test, a stress test was also performed on MW-11 on August 23, 2017 as an alternate means of assessing LNAPL transmissivity. The monitoring well was pumped dry of water and LNAPL over a period of 30 minutes. The well was then allowed to recharge and the depths to LNAPL and groundwater were measured every 2 minutes for a total of 50 minutes. Groundwater recovered to its static pre-pumping depth within approximately 50 minutes of cessation of pumping with no measurable NAPL. The field notes for the MW-11 stress test and the associated recovery measurements are included in **Appendix F**.

4.4.3 LNAPL Sampling

On August 22, 2017, LNAPL was collected from the peristaltic pump and tubing at H-3P and at MW-11 during the baildown test (see **Section 4.4.1**). Additional sample volume was collected on August 23, 2017 from both MW-11 and H-3P to ensure adequate volume for the required laboratory analyses. Samples were placed in an ice-filled cooler and transported to TestAmerica in Edison, New Jersey (for chemical testing) and PTS (for physical testing) under proper chain-of-custody procedures for the analyses. The LNAPL samples from MW-11 and H-3P were analyzed for:

- LNAPL Viscosity, Density, and Specific Gravity by ASTM D445, D1481, and API RP 40
- Initial Boiling Point by ASTM D86
- MADEP VPH (including BTEX and naphthalene)
- NJDEP EPH
- VOCs by USEPA Method 8260C, including TICs
- SVOCs by USEPA Method 8270D, including TICs

The MW-11 and H-3P LNAPL analytical results are discussed in **Section 6.0** and documented in the laboratory report included in **Appendix G.**

4.5 Natural Degradation Testing Program

Assessment of LNAPL source depletion, natural mass losses, and biodegradation of LNAPL constituents were identified as supplemental investigation activities. The wells identified for natural degradation testing are summarized in **Table 4-6** and shown on **Figure 4-1**. The work was planned in two phases to use data collected from the first phase to further define the scope for the second phase. A summary of the two work phases is provided in the following sections.

4.5.1 Phase I (Geochemistry, Biochemistry, and Microbial Assessment)

The first phase of the testing program was designed to further define the general geochemistry, biochemistry, and microbial biology within the groundwater plume to validate the processes currently identified which are contributing to the natural degradation of petroleum hydrocarbons. In addition, the scope of work was designed to evaluate whether enhancements could accelerate degradation rates. The objectives of this phase of work were as follows:

- Characterize the current geochemistry and biochemistry within the groundwater plume to allow direct comparison with the microbiological analyses (using groundwater samples).

- Validate and describe the processes contributing to biodegradation of petroleum hydrocarbons by evaluating the type of petroleum-degrading bacteria present at the Site (through the use of QuantArray-Petroleum Analysis on Bio-Trap samplers).
- Evaluate the population densities of petroleum degraders and determine if these densities are sufficient to support meaningful intrinsic biodegradation in the groundwater plume area into the future (through the use of QuantArray-Petroleum Analysis on Bio-Trap samplers).

The selected wells were gauged on October 9, 2017 with an oil/water interface probe to measure groundwater levels and the presence/absence of LNAPL. The depth to groundwater was measured in each well to the nearest 0.01 foot to the top of casing. The measurements were recorded in a field book or on field forms.

Following well gauging on October 9, 2017, all monitoring wells were purged and sampled via low-flow procedures from October 9 to 11, 2017 by TestAmerica of Edison, New Jersey. Groundwater sampling was conducted by low-flow purging and sampling procedures to comply with the guidelines summarized in SOPs summarized in the Work Plan. The TestAmerica well purging forms are included in the groundwater sample analytical report (**Appendix H**).

Groundwater samples were collected directly from the pump tubing within laboratory supplied glassware, properly preserved and labeled, placed directly on ice, and shipped under chain-of-custody to TestAmerica in Edison, New Jersey. Groundwater samples were collected and analyzed for the following analytes at all well locations:

- Contaminants:
  - MADEP for VPH (including BTEX and naphthalene, aliphatics, and aromatics)
  - NJDEP EPH
  - VOCs by USEPA Method 8260B, including TICs
  - SVOCs by USEPA Method 8270C, including TICs
- Field Parameters:
  - Temperature
  - pH
  - Conductivity
  - Dissolved Oxygen (DO)
  - Redox potential
  - Turbidity
- Geochemistry Parameters:
  - Dissolved organic carbon (DOC)
  - Methane
  - Carbon dioxide
  - Sulfate/Sulfide
  - Nitrate/Nitrite
  - Dissolved iron (Fe^{2+}), Total Iron, and Manganese
  - Alkalinity
  - Volatile Fatty Acids
- Biodegradation Parameters.
  As part of the Phase 1 biological assessment, Bio-Traps were used to characterize and quantify the bacterial populations using Microbial Insights QuantArray analytical method. The method (QuantArray-Petroleum Suite) used deoxyribonucleic acid (DNA) microarrays and quantification of polymerase chain reaction (qPCR) to quantify the specific functional genes responsible for both aerobic and anaerobic biodegradation of BTEX; polycyclic aromatic hydrocarbons (PAHs); and a variety of short and long chain alkanes. Biological activity is generally restricted to the aqueous

phase, although a number of bacterial species (for example *Pseudomonas*) form bio-surfactants that enable some degradation in water/oil mixtures. Based on this, the highest bacterial populations are generally observed within areas of elevated hydrocarbon constituent concentrations (within the former source areas), but may also occur on the fringes of the plume (where concentrations are lower and bacteria are degrading the flux of constituents from upgradient areas).

The QuantArray-Petroleum Suite Bio-Traps were provided by Microbial Insights Inc. of Knoxville, Tennessee and installed by EHS Support on October 12, 2017 following the completion of well sampling. The biotraps were hung and secured in the well with a nylon line, with biotrap samplers established at a depth of 3 feet below the water table or 1 foot below the measured depth of LNAPL in the well. Subsequently, EHS Support removed the biotraps after 62 days of incubation on December 13, 2017 and placed them in sterile plastic bags provided by the laboratory for shipping. The biotraps were then submitted to Microbial Insights in Knoxville, Tennessee under chain-of-custody documentation for laboratory analysis. The sample chain-of-custody documentation is provided in the laboratory report included in **Appendix I**. The biogeochemical data results and evaluation are discussed in **Section 8.0**.

4.5.2 Phase II (Assessment and Qualifications of In-Situ Biodegradation)

Based on the findings of the Phase I assessment (the presence of specific bacterial communities), the Phase II assessment was conducted using 'baited' Bio-Traps to assess if biodegradation of monoaromatics (benzene) is occurring in shallow zone groundwater. Benzene was selected as an appropriate bait based on its ready availability and its suitability for use as a surrogate for assessing biodegradability of the key constituents detected in LNAPL and groundwater including alkylbenzenes (like toluene, ethylbenzene, and xylene) and other light- to moderate-weight polyaromatic hydrocarbons (like naphthalene).

Stable isotope probing (SIP) techniques using ^{13}C-labeled benzene 'baited' Bio-Traps (SIP-Traps) were installed in shallow zone wells located within and along the nominal centerline, within the former source area (Former Tank Farm A) and downgradient/cross-gradient (U.S. Avenue and Seep Area) within the shallow zone benzene plume at wells MW-11, MW-12, MW-13R, MW-26, and MPMW0009. The SIP-Traps were installed to assess the following information:

- Determine whether benzene (and similar compounds) is biodegraded (or not) in the Site setting.
- Assess the degree to which benzene (and similar compounds), during biodegradation, is converted to new bacteria cell mass or used as an energy source for bacterial metabolism of other compounds.

The SIP-Traps were installed on February 22, 2018 and were removed after 61 days of incubation on April 24, 2018. The SIP-Traps were placed in sterile plastic bags (provided by the laboratory for shipping) and then submitted to Microbial Insights in Knoxville, Tennessee under chain-of-custody documentation for laboratory analysis. A supplemental technical memorandum including the sample chain-of-custody documentation, laboratory analytical report, and results from this assessment is included in **Appendix J**. The biogeochemical data results and evaluation are discussed in **Section 8.0**.

4.6 Quality Assurance and Quality Control

As outlined in the Weston Quality Assurance Project Plan (QAPP) (Weston, 2009), control checks were implemented in order to verify the overall quality of the sampling and analytical data. Implementation of quality assurance/quality control (QA/QC) was demonstrated through the use of trip blanks, blind field duplicate samples, and rinse blank samples. Quality control samples were collected over the course of the project in accordance with the specifications contained within the QAPP.

Samples were collected in accordance with SOPs provided in the Work Plan. Field QA/QC samples were collected in accordance with the specifications in the Weston 2009 QAPP (Weston, 2009) and included the following:

- One trip blank was submitted in each cooler containing samples for volatile analysis.
- Equipment blanks were collected at a rate of 5 percent for water samples.
- Blind field duplicate samples were collected at a rate of 10 percent for water samples. Blind field duplicate samples were not collected for soil samples due to limited sample volume from the soil cores.

The results of those field QC samples, as well as any impact to the associated data, are discussed in the individual data review packages. Groundwater samples and associated field QC were analyzed by TestAmerica Laboratories in Edison, New Jersey; Buffalo, New York; and Nashville, Tennessee by the following analyses:

- USEPA SW-846 Methods 8260C and 8260C selective ion monitoring (SIM) for VOCs
- USEPA SW-846 Methods 8270D and 8270D SIM for SVOCs
- USEPA 6010C for metals
- USEPA Method RSK-175 for dissolved gases
- MADEP for VPH
- NJDEP EPH
- ASTM Method D516-90, 02 for sulfate
- Standard Methods SM 2320B for alkalinity
- SM 3500 FE D for ferrous iron
- SM 4500 NO_3 F for nitrogen, nitrate
- SM 4500 S^2 F for total sulfide
- SM 5310B for DOC
- Method VFA-IC for volatile fatty acids

Groundwater data were reviewed by EHS Support in accordance with the NJDEP Site Remediation Plan (SRP) Data of Known Quality Protocols Technical Guidance (NJDEP, 2014).

Soil samples, along with their associated field QC samples, were analyzed by TestAmerica Laboratories in Burlington, Vermont; Nashville, Tennessee; and Edison, New Jersey by the following analyses:

- USEPA CLP Method SOM02.3 for trace and low/medium VOCs
- USEPA CLP Method SOM02.1 for SVOCs
- MADEP for VPH
- NJDEP EPH

Soil data was validated by Weston. According to the data validation reports, "*The data validation was conducted in general accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Superfund Data Review, latest revisions of Region 2 Trace Volatile Data Validation SOP HW-34, Low/Medium Volatile Data Validation SOP HW-33, Semi-volatile Data Validation SOP HW-35A, MA VPH and NJ EPH SOPs, the Quality Assurance Project Plan and the applicable methods…*".

4.7 Variances and Deviations

Investigation variances and deviations from procedures summarized in the Work Plan are as follows:

Soil Sampling Locations – Deviations from Locations Specified on Work Plan Figure 4-1:

- Soil core locations DP-13 and DP-14 of Area K were completed in Foster Avenue at locations shown on **Figure 4-1**. The co-located CPT/MIP locations for these borings could not be installed due to limited access and encroachment restrictions at Foster Avenue. The co-located CPT/MIP locations were moved to the southwest in the Seep Area parking lot and are identified as CPT/MIP-16 and CPT/MIP-20.
- The co-located CPT/MIP location for soil core DP-16 (CPT/MIP-15) of Area K had to be moved from the soil core location to the parking area due to restricted CPT rig access to the DP-16 location.
- CPT/MIP-31 of Area J was not advanced due to the limited property access window of time permitted for work.
- The soil core location for DP-05 of Area H could not be surveyed by the survey contractor on December 12, 2017 due to restricted property access. However, it was surveyed via GPS methods at the time of drilling.

Soil Sample Collection and Analysis – Deviations from Work Plan:

- While elevated vapor headspace readings were identified in multiple soil sample core locations, only a subset of soil cores were selected for analytical testing (see **Table 4-4** for summary of samples selected for analysis).
- The USEPA CLP SOMO2.4 laboratory analytical methods for trace and low/medium VOCs (including TICs) and SVOCs (including TICs) were conducted for soil samples submitted for analysis instead of USEPA SW846 Methods (VOCs by USEPA Method 8260B and SVOCs by USEPA Method 8270C) specified in the Work Plan.
- The petrophysical soil samples were submitted to PTS because the Santa Fe Springs, CA facility was closed in July 2017.
- UV light photography was conducted on the soil cores submitted to PTS in addition to visible light photography to detect potential florescence in the soil samples.
- An additional soil sample at FOC-01 was collected due to encountering saturated soil at approximately 9 feet bgs and again at 12.5 feet bgs; therefore, three samples were collected for laboratory analysis (7.5 to 8 feet bgs, 14 to 14.5 feet bgs, and 18 to 18.5 feet bgs).
- The Phase II (Assessment and Quantification of In-situ Biodegradation) sampling by use of SIP-Traps was performed to confirm the preliminary finding that biodegradation of petroleum hydrocarbons is occurring in shallow zone groundwater at wells MW-11, MW-12, MW-13R, MW-26, and MPMW0009.

5.0 GEOLOGY AND HYDROGEOLOGY

The following section evaluates the Site geologic and hydrogeologic data and associated controls on LNAPL fate and transport. Drawing on the existing hydrogeologic framework developed through previous investigation work, this section assesses geologic complexity (i.e., the presence of variable fractions of fines within the fine sand matrix) and groundwater level fluctuations and flow as potential key controls on historical LNAPL migration, the resulting current lateral and vertical distribution, and ongoing residualization processes. The key lines of evidence evaluated in this section include both historical and 2017 data as follows:

- Historical geophysical assessments
- Historical and 2017 soil boring logs
- 2017 CPT logs and associated SBT characterization
- 2017 high-resolution soil core photography
- 2017 laboratory grain size and soil properties analyses
- Historical groundwater level fluctuations
- Groundwater flow and aquifer properties

During the 2017 LNAPL investigation, soil core lithology information was obtained at Site Areas A through K as shown on **Figure 4-1**. Copies of the CPT/MIP results, soil petrophysical property analytical results, conventional soil boring logs, and soil core photography from this investigation are provided in **Appendix B, Appendix C, Appendix K,** and **Appendix L,** respectively. A summary of the CPT/MIP and soil core boring depths are summarized in **Table 4-1** and **Table 4-2**, respectively. Regional and site geology and hydrogeology are described in the FMP RIR (Weston, 2018) and Groundwater Technical Memorandum (Weston, 2014).

5.1 Site Geology

The lithologic unit of interest for this LNAPL investigation is the unconsolidated soils within the upper sand facies of the lower Kirkwood Formation (Owens et al., 1998). Lithology of the upper sand facies has been previously described as fine- to coarse-grained (predominantly fine- to medium-grained) sand, white, gray, brown, yellow, orange, containing trace to some clay, silt, and gravel, and locally micaceous (Weston, 2018). The upper sand facies were present to depths of approximately 35 to 60 feet bgs (Weston, 2014). The previous natural gamma assessment conducted in 2012 and 2013 (Weston, 2014) also identified the lower Kirkwood Formation as generally sand which typically fines upward. The results of the natural gamma survey is included in the *Groundwater Technical Memorandum* (Weston, 2014), with the borehole geophysical logging reports, provided in **Appendix M.**

From a detailed assessment of the gamma survey data, zones with higher proportions of fines are observed in the upper soil sequence with significant spatial variability observed across the Site. Shifts in the natural gamma counts (interpreted as increasing fine-grained material within the borehole lithology) were observed at shallow depths near the historical range of groundwater elevations in monitoring well borings (MW-30 to MW-33, MW-41, MPMW0006, and MPMW0013). Fine-grained intervals noted near the historical range of groundwater elevations from the gamma log assessment are summarized in **Table 5-1**.

Similar to the natural gamma log assessment, EC profiles from the LIF and MIP borings completed from 2012 to 2013 (Weston, 2014) also indicate similar complexity in geological conditions. Greater EC responses (indicating the presence of fine-grained soils) were also generally identified near the historical range of groundwater elevations in LIF/MIP borings MIP-3 to MIP-8, and MPSB0158 to MPSB0178. These fine-grained intervals noted from the EC log assessment are summarized in **Table 5-2**, and the EC logs are included in **Appendix M**.

The historical gamma survey and EC soil borings with shallow, fine-grained soil intervals generally less than 25 feet bgs and intersecting or within 5 feet of the historical 2010 to 2017 groundwater elevation range were identified in the following areas as depicted on **Figure 5-1**:

- Former Resin Plant and Material Storage Area (boring MPSB0160)
- Former Tank Farm A (borings MPSB0161 to MPSB0163, MIP-07, MW-30, and MPMW0006)
- Former Main Plant (MPSB0176, MPSB0178, MW-31, and MIP-04)
- Seep Area (MIP-03, MIP-05, MIP-06, MPSB0165, MPSB0167, and MW-33)
- Hilliards Creek (MPSB0164 and MPSB0175)
- Former Service Station/Tavern (MW-32)

Consistent with the interpreted fine-grained intervals, based on review of the geophysical logs, soils identified within the upper facies of the Kirkwood formation (based on 2017 conventional and CPT soil borings) consisted of surfical fill materials underlain predominantly by fine sand with varying fractions of silt and clay throughout. Conventional soil core locations were completed to total depths ranging from 10 to 45 feet bgs (**Table 4-2**). The interpreted total depth of the upper facies of the Kirkwood formation was identified at borings completed at the Seep Area (DP-13, DP-14, and DP-17 to DP-20) and Hilliards Creek (DP-16), which ranged from approximately 20 to 32 feet bgs.

Soil lithology identified from 2017 soil cores using USCS convention consisted of sand (SP/SW), gravel (GP), silty sand (SM), and silt/clay (ML/CL) (soil boring logs and core photography are provided in **Appendix K** and **Appendix L**, respectively). Similarly, CPT borings exhibited variability in pore pressures, friction ratios, and resultant SBT (Lunne, Robertson, and Powell, 1997). As shown on the CPT logs (**Appendix B**), the predominant SBTs are silty sand/sand sandy silt, and sand with significant zones of clayey silt, silt, and clay. Gravelly sand is also observed, but limited to upper soils (0-5-foot range) interpreted as fill.

Four hydrogeologic cross sections were developed to depict the lithology at the Site using the four primary USCS categories noted above. A cross-section location map is provided as **Figure 5-2** and cross sections A-A' through D-D' are provided as **Figure 5-3** through **Figure 5-6**. A general description of the soils identified at depth within the upper facies of the Kirkwood formation is summarized below.

Fill Materials

- Surficial fill materials consisted of asphalt, concrete, and dark gray to black sand, gravelly sand, and gravel. Accessory materials present in the Fill include bricks, glass, asphalt, concrete, wood fragments, and angular to subangular gravel and rock fragments of varying composition.
- The USCS classifications for the fill materials were SP/GP (poorly graded sand, gravelly sand, and poorly graded gravel) and consistent with SBTs from the CPT logs.
- The depth of the fill materials ranged from approximately 2 to 7 feet bgs across the Site. Thicker intervals of fill materials (greater than 3 feet bgs) were noted in borings DP-09 (Former Resin Plant and Material Storage Area), DP-10 (Main Plant), DP-12 (U.S. Avenue), DP-16 (Hilliards Creek), DP-20 (Seep Area), and DP-22 (Former Tank Farm A).

Upper Sand Facies of the Lower Kirkwood Formation

- The dominant soil type was fine sand as evidenced by the results of the grain size analysis summarized on **Table 5-3A**. These fine sand samples were identifed with trace to little amounts of gravel, coarse sand, and medium sand. However, the fine sand contained abundant silt and clay ranging from approximately 5 percent to 42 percent by weight.
- USCS classifications for the sands were SW/SP (well to poorly graded sand) and SM (silty sand) and described as micaceous with fine gray, white, or black sand banding, with trace coarse-grained sand inclusions, and intervals of iron oxide weathering consistent with historical observations.

- USCS classifications for the silts or clay were ML/CL and described primarily as thin to moderate intervals of browinsh yellow, yellowish brown, grayish brown, pale brown, and gray silt (sandy silt, clayey silt, or silt); or as thin intervals of silty clay within the overall fine sand matrix. The thickness of the fine-grained soil intervals varried from a few inches to approximately 4 feet (DP-4 from 27 to 31 feet bgs). These fine-grained intervals were identified at all soil core locations at the various thicknesses (with the exception location DP-23 located at the Former Service Station/Tavern) encountered below ground surface from approximately 3.6 feet bgs (DP-11) to approximately 39 feet bgs (DP-21) as summarized in the soil boring logs (**Appendix K)** and shown in the CPT sounding data results (**Appendix B**).
- Laboratory soil grain size analysis results, USCS field logging descriptions, core photography, and CPT results correlate well as shown on **Table 5-3A**, **Table 5-4A**, and **Table 5-4B**. Examples illustrating the complementary lines of evidence have been developed for soil borings DP-17, DP-21, and DP-12 as **Figure 5-7**, **Figure 5-8**, and **Figure 5-9**, respectively. **Figure 5-7** provides an example for soils at the interface with the overlying Fill and **Figure 5-8** and **Figure 5-9** provide examples for the presence of fine-grained soil horizons within the overall fine sandy matrix.
- Intervals of fine-grained soils (shown as green to blue coloration on the SBT portion of the CPT logs; **Appendix B**) were identified at 31 of 35 CPT locations within 5 feet of the water table at each location. The four locations identified without fine-grained soils within the water table were at the Former Service Station/Tavern Area J (CPT/MIP-32, CPT/MIP-33, and CPT/MIP-35) and Former Tank Farm B Area (CPT/MIP-18). The presence of fines in relation to the historical minimum and maximum groundwater level elevations (using 2010 to 2017 data) are also depicted on the hydrogeologic cross sections (**Figure 5-3** to **Figure 5-6**). As shown, the fine-grained ML/CL intervals are interpreted as discontinuous intervals in the shallow subsurface (less than 20 feet bgs); however, they become more laterally continuous at deeper intervals (greater than 20 to 25 feet bgs). Thicker intervals of the fine-grained ML/CL interval were found downgradient of Area A (Former Tank Farm A) within Area E (Seep Area) and Area K (Hilliards Creek/Seep Area). Fine-grained intervals (ML/CL) within 5 feet of the historical groundwater elevation range were identified at the following areas:
    - Former Resin Plant and Material Storage Area (borings DP-08 and DP-09) (Area D)
    - Former Main Plant (DP-10 and DP-11) (Areas I and C)
    - Former Tank Farm A (DP-21) (Area A)
    - Seep Area (DP-17, DP-18, DP-19) (Areas E,F, and K)
    - U.S. Avenue/Eastern Off-Property Area (DP-2 to DP-5, and DP-12) (Areas G and H)
- The total and effective porosity of the upper facies of the lower Kirkwood Formation ranged from 30 percent to 44 percent and 23 percent to 36 percent, respectively (**Table 5-3B)**. The porosity values are consistent with expected values for the unconsolidated fine-grained sands with variable fractions of fines.
- Laboratory analytical results for TOC and foc from samples collected at borings FOC-01 and FOC-02 (shown on **Figure 4-1**) were only present above detection limits in 2 of 5 samples submitted for analysis. Low foc concentrations were detected in samples from FOC-01 above groundwater (0.002 gram/gram at 7.5 to 8 feet bgs) and below groundwater (0.00053 estimated (J) at 14 to 14.5 feet bgs). The low to non-detect TOC/foc results are consistent with the depositional environment and sandy lithology of the upper facies of the lower Kirkwood Formation. The TOC/foc laboratory analytical results are summarized in **Table 5-3C.**

Based on the various lines of evidence collected as part of the 2017 LNAPL investigation (CPT soil types, field logging, core photography, and soil grain size analysis), thin to moderate intervals of finer-grained soil intervals were identified across the FMP area, within the zone of historical groundwater fluctuations, consistent with previous natural gamma and EC geophysical logging results. In addition to discrete fine-grained intervals, significant variability in the percentage of fines within the fine sand matrix is present throughout the formation as evidenced by the grain size analyses. Therefore, while the upper sand facies of the lower Kirkwood Formation is prepredominantly fine sand, fine-grained soil (silts and clays) are present as both laterally distinct zones and within pore spaces throughout the fine sand matrix. The variability within the fine sand-dominated sequence is consistent with the low, but variable energy depositional environment of the New Jersey Coastal Plain, consisting of low-energy inundated areas, marshes, estuaries, and barrier islands that are boarded by streams (Kummel, 1915).

Consistent with the fundamentals described in **Section 4.0**, these finer-grained soils have the potential for higher residual LNAPL saturations than coarser-grained soils and combined with historical fluctuations of groundwater levels, were key controls on historical LNAPL mobility. While sufficient LNAPL heads were present to drive migration into fine-grained soils and through fine sands with high proportions of fines, current LNAPL heads (in the limited wells with measurable LNAPL) are insufficient for further migration. Water level fluctuations (which have residualized mass) and other mass loss mechanisms have contributed to trapping LNAPL in finer-grained soil horizons. LNAPL mobility and potential recoverability are further discussed in **Section 7.0**.

5.2 Site Hydrogeology

The summarized information in the following sections is based on previously submitted information from 2014 and 2018 and focuses on hydrogeology of the shallow groundwater zone due to the limited vertical distribution of LNAPL impacts at the site.

5.2.1 Hydrostratigraphic Units of Interest

The Site is within the outcrop area of the Kirkwood-Cohansey Aquifer System. Locally, there are six major aquifers and one minor aquifer (**Figure 5-10**). The shallowest major aquifer identified at the Site is the Kirkwood-Cohansey. This aquifer has been described as having low to moderate hydraulic conductivity values. Based on the geologic data and groundwater elevation measurements, the shallow groundwater within the FMP is unconfined. Previous soil log data have not identified semi-confining or confining layers in the shallow groundwater zones (aquitard or aquiclude); however, as discussed in **Section 5.1**, intervals of fine-grained soils are noted throughout the area at varying depths and may influence groundwater flow locally.

5.2.2 Groundwater Flow and Hydraulic Gradients

The shallow groundwater monitoring well network is shown on **Figure 5-11** and the well screen interval depths are referenced in **Table 5-5**. Shallow groundwater monitoring wells range in depth from approximately 9 to 30 feet bgs.

Historical groundwater monitoring well elevation data from August 2010 to October 2017 are summarized in **Table 5-6**. Groundwater is encountered at depths of approximately 10 to 12 feet bgs in areas of the FMP located north of Foster Avenue and east of U.S. Avenue. Within the Seep Area, groundwater is typically encountered at a depth of 1 to 2 feet bgs, but it can occasionally rise to essentially ground surface. Higher groundwater elevations are encountered during the spring and typically exhibit seasonal variations of approximately 2 to 4 feet. Shallow groundwater elevations identified during the LNAPL investigation (July to October 2017) were consistent with the average to low groundwater elevations encountered during the late summer and fall. Historically during high groundwater table conditions within the Seep Area, groundwater and LNAPL was known to daylight as seeps within the parking lot and adjacent to Hilliards Creek.

The August 2017 groundwater elevations and flow direction for the shallow zone (and intermediate zone) are shown on **Figure 5-11**. Monitoring well measurements collected from the shallow aquifer ranged from 1.45 feet bgs (well MPMW0001) to 17.07 feet bgs (well WP-7). Elevations calculated from the measurements ranged from 90.93 feet above mean sea level (AMSL) (well MW-SCAR) (excluding well MPMW0005) to 74.35 feet AMSL (well MPMW0030). Consistent with historical data, the flow direction of shallow groundwater is influenced by Site topography and the presence of four main surface water bodies (upgradient: Silver Lake and downgradient: Hilliards Creek, Bridgewood Lake, and White Sand Branch).

As shown on **Figure 5-11**, the impounded water at Silver Lake (higher elevation) acts as a localized recharge area for shallow groundwater, and Hilliards Creek, Bridgewood Lake, and White Sand Branch (lower elevations) act as localized groundwater discharge points for shallow groundwater. The overall general flow direction of surface water from the FMP and Former Tank Farm A is southwest towards Hilliards Creek and Bridgewood Lake while east of U.S. Avenue the groundwater flow is southward towards White Sand Branch (which discharges into Bridgewood Lake). The hydraulic gradient is approximately 0.010 feet/foot from northeast of the Former Resin Plant through the Seep Area towards Hilliards Creek and 0.017 feet/foot east of U.S. Avenue from the Former Service Station/Tavern area towards White Sand Branch.

5.2.3 Aquifer Properties

Hydraulic conductivity values from shallow zone monitoring wells range from approximately 0.2 feet/day to 14 feet/day (Weston, 2014). Groundwater seepage velocity estimates for the shallow zone (using April 2011 horizontal hydraulic gradient information (Weston, 2014)) ranged from approximately 0.01 ft/day to 0.08 ft/day. A summary of the seepage velocity calculations, including a figure illustrating groundwater flow pathway, is included in **Table 5-7**.

6.0 NATURE & EXTENT OF LNAPL

As described in the Work Plan, and summarized in **Section 2.4**, potential residual LNAPL, historically classified as weathered mineral spirits, is present at and below the groundwater table at the Site. As described in **Section 2.5**, the pre-investigation understanding of the extent of LNAPL is at and immediately downgradient of the former source areas at the Site (including Former Tank Farm A, the Seep Area, and Former Service Station/Tavern).

The following sections further evaluate the nature and extent of LNAPL through an assessment of LNAPL physical properties, composition, and distribution using a lines of evidence approach based on supplemental LNAPL, soil, and groundwater data collected as part of LNAPL Investigation activities. Where relevant, historical data presented in previous reports is included to provide additional lines of evidence for the nature and extent of LNAPL and to assess temporal changes in LNAPL chemistry and distribution. The key lines of evidence are as follows:

- Historical and 2017 LNAPL samples submitted for chemical and physical properties analyses
- Historical LNAPL measurements from wells
- 2017 laboratory LNAPL pore fluid saturation analysis
- Historical and 2017 soil boring logs and the following indicators of LNAPL: visual presence, odors, headspace responses
- Historical and 2017 MIP/LIF responses
- Historical hydrophobic dye assessment
- Calculated threshold values indicative of the presence of LNAPL leveraging historical soil vapor, groundwater, and soil data

The 2017 LNAPL Investigation locations are provided on **Figure 4-1**.

6.1 Physical Properties

As discussed in **Section 3.1**, physical properties, such as viscosity and density, influence LNAPL mobility within the subsurface. LNAPL samples analyzed as part of 2017 LNAPL Investigation activities were collected from MW-11 (Former Tank Farm A) and H-3P (a horizontal recovery well in the Seep Area). These were the only locations where enough LNAPL was present to collect a sample. LNAPL physical properties data for these samples are provided on **Table 6-1**. Physical properties for historical LNAPL samples collected within the Seep Area, Former Tank Farm A, and Former Service Station/Tavern are provided on **Table 6-2**.

As shown on **Table 6-1**, the LNAPL specific gravity value for MW-11 and H-3P are 0.79 and 0.94 at 70°F, respectively. For reference, published API Gravity values (Irwin et al., 1997) for mineral spirits range from 48.8 to 50.6 (specific gravity of approximately 0.78 at 60°F), close to the measured value for the 2017 MW-11 sample.

The specific gravity of LNAPL samples collected from the Site areas historically ranged from 0.66 to 1.0. Specific gravity values ranged from 0.66 to 1.0 in the Seep Area, 0.69 to 1.0 in the former Tank Farm A area, and 0.76 from one Former Service Station/Tavern well, MW-26. Omitting historical samples representing LNAPL-water mixtures and/or aqueous samples (as noted in the sample IDs on **Table 6-2**), the average specific gravity value across all Site areas is 0.79, consistent with the published value for mineral spirits. The specific gravity values approaching 1.0, even if not specifically noted, may indicate that the LNAPL samples contain water (the specific gravity of water is 1.0), contain appreciable suspended solids (e.g., rust, soil), and/or represent more weathered LNAPL that is comprised of more-dense hydrocarbons. Further evaluation of the chemical composition of the LNAPL samples collected at the Site is discussed in **Section 6.2**.

Kinematic viscosity results for the 2017 LNAPL samples range from 1.4 to 1.5 cSt at 70°F (**Table 6-1**) and historical samples range from 0.68 to 1.2 cSt. The average viscosity value across all Site areas is 1.0 cSt. For reference, the kinematic viscosity of water at 25° C is approximately 0.9 cSt and thus the viscosity of LNAPL is not anticipated to be a major control on potential LNAPL mobility within the subsurface. The slightly higher viscosity values of the 2017 samples compared to the historical samples may be an indication of weathering as viscosity tends to increase with the degree of weathering.

As shown on **Table 6-2**, select historical LNAPL samples were submitted for more detailed physiochemical analysis. Vapor pressures range between 6.26 mmHg to 7.86 mmHg (consistent with mineral spirits - NOAA, 1999). The sample solubility values are low (4.4 mg/L and 10.8 mg/L) and reflect the dominance of low solubility hydrocarbon constituents in the LNAPL. It is noted that these values are considerably lower than a published value of 45.9 mg/L for mineral spirits (Irwin, et al., 1997), another indicator of the weathered nature of the LNAPL (as more soluble constituents within the LNAPL dissolve into groundwater over time). Interfacial tension and surficial tension within LNAPL samples analyzed were less than 28.7 dynes/cm (excluding samples interpreted as LNAPL-water mixtures).

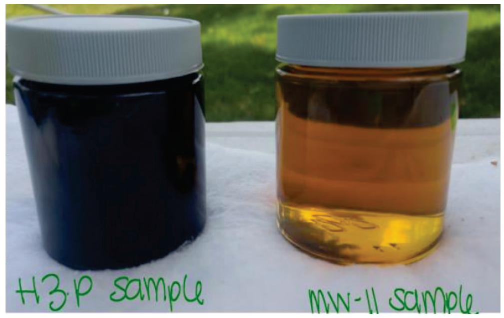
The initial boiling point for LNAPL was also analyzed for the 2017 MW-11 and H-3P samples (**Table 6-1**). As shown, the initial boiling points were 240°F and 275°F. These values are slightly lower than published boiling point ranges of 310°F to 375°F for mineral spirits (NOAA, 1999) and likely reflect the compositional differences in the LNAPL at the Site compared to the referenced data sheet for fresh mineral spirits.

An additional physical property of LNAPL that is helpful in characterization is fluorescence under UV light. Depending on the chemical composition of the LNAPL, some LNAPLs strongly fluoresce (e.g., monoaromatic hydrocarbons), while others do not fluoresce at all (aliphatic hydrocarbons such as those that comprise the majority of mineral spirit constituents).

The high-resolution core photographs (**Appendix L**) taken as part of 2017 LNAPL Investigation activities include photographs taken under white light (left) and UV light (right). The UV photographs are not easy to distinguish from the black background because the majority of LNAPL present at the Site does not fluoresce (only minor to moderate fluorescence is noticeable as a result of fluorescing minerals within the soil cores). This observation further supports the assertion that LNAPL composition is relatively consistent across the Site and supports the historical understanding that LNAPL at the Site is predominantly comprised of weathered mineral spirits (i.e., aliphatic hydrocarbons). The notable exceptions to this are in the following areas and may indicate minor variations in LNAPL composition and greater mass fractions of aromatic hydrocarbons where fluorescence is observed:

- Former Resin Plant and Material Storage Area at soil core DP-09 (7.2 to 8 feet bgs and 8.3 to 9.5 feet bgs)
- Hilliards Creek/Seep Area at soil cores DP-13 (3 to 5 feet bgs), DP-14 (5.8 to 7 feet bgs), DP-17 (2.8 to 3.8 feet bgs), DP-19 (3.3 to 4 feet bgs), and DP-20 (5.5 to 7 feet bgs)

The visual appearance of LNAPL also serves as a qualitative indicator of the degree of weathering and/or presence of impurities within the LNAPL. As shown in the following photograph of the 2017 LNAPL samples (field notes provided in **Appendix F**), the sample from H-3P (left) is a much darker color than the MW-11 sample (right) suggesting that the LNAPL present in H-3P is either more weathered or contains additional impurities compared to the sample collected at MW-11. For reference, the appearance of fresh mineral spirits is colorless (NOAA, 1999).



6.2 Chemical Composition

Chemical analysis of LNAPL samples has been conducted at the Sherwin-Williams FMP since 1993. Samples have been collected from wells in the Seep Area (Wet Well, H-3P, MW-13, MW-13R, MW-21), the Former Tank Farm A area (MW-1 and MW-11,), and the Former Service Station/Tavern (MW-26 and MW-27) (**Figure 6-1**). Historical waste characterization samples have been collected from the product recovery system.

Chemical analysis was performed on the 2017 LNAPL samples from MW-11 and H-3P, complementing the historical dataset. Results are summarized on **Table 6-3** (2017 samples and 2011 H-3P sample), **Table 6-4** (historical well and product tank samples), and **Table 6-5** (historical waste samples). As noted on **Table 6-4**, several historical well samples are interpreted as aqueous samples or LNAPL-water mixtures and therefore the concentrations do not represent concentrations within the LNAPL.

Historical laboratory chemical analyses have included Target Analyte List (TAL) analysis (e.g. VOCs, SVOCs metals), total and extractable petroleum hydrocarbon (TPH and EPH) analysis, and waste disposal parameters (i.e. toxicity characteristic leaching procedure [TCLP] and Resource Conservation and Recovery Act [RCRA] Characteristics). The 2011 sample collected from H-3P was also analyzed for VOC TICs. Due to the nature of the samples (i.e., product) reporting limits are inherently elevated due to required dilutions to perform the lab analyses. Despite the elevated reporting limits, however, the LNAPL samples are useful in identifying the predominant compounds which ultimately supports a better understanding of LNAPL fate and transport and the potential for LNAPL to act as a source to other media.

In addition to the analytical testing, fingerprint analysis of LNAPL samples collected from MW-1, MW-11, MW-21, and MW- 26 in 2009 and 2010 identified the LNAPL as a petroleum product that most closely resembles degraded mineral spirits (Weston, 2014). This is consistent with the historical chemical characterization efforts and further supported by the physical properties of the LNAPL discussed in **Section 6.1**.

Key constituents present within the various historical samples include polycyclic aromatics (2-methylnaphthalene, naphthalene), monocyclic aromatics (benzene, ethylbenzene, toluene, xylenes), and monocyclic aliphatics (cyclohexane, isopropylbenzene). Other polycyclic aromatics have been detected in the LNAPL, but generally at much lower concentrations and thus are not likely to partition into groundwater (as they have low solubilities and make up a very minor percentage of the LNAPL mass). Historical LNAPL samples also contained high concentrations of diesel range petroleum hydrocarbons (C10 to C24 range).

Based on the key LNAPL constituents present in the historical samples, the 2017 samples were analyzed for EPH, VPH, VOCs (including TICs), and SVOCs (including TICs) consistent with the analytical methods described in **Section 4.4**. As shown on **Table 6-3**, the bulk chemical composition of the 2011 and 2017 LNAPL samples are similar with aliphatic hydrocarbons (based on EPH and VPH results) comprising the majority of the LNAPL (87.4 percent, 74.4 percent, and 81.5 percent of total detected constituents for the H-3P 2011, H-3P 2017, and MW-11 2017 samples, respectively). It is noted that the EPH C9-C12 analytical results are used in favor of the VPH C9-C12 results because the VPH analysis (purge and trap with quantification via PID and FID responses) is subject to greater interference compared to the EPH (solvent extraction and silica gel cleanup) (MADEP, 2002).

Total aromatic concentrations (based on EPH and VPH results) comprise relatively small proportions of the LNAPL samples (10.8 percent, 11.2 percent, and 3.5 percent for the H-3P 2011, H-3P 2017, and MW-11 2017 samples respectively). The aliphatic-dominated LNAPL (primarily C9 to C12 range), is consistent with the typical hydrocarbons present in mineral spirits. The similarity in bulk composition supports the findings of the physical properties analysis provided in **Section 6.1** and indicates that intrinsic LNAPL mobility (i.e., independent of hydrogeologic controls) within the subsurface will be similar across the Site. However, while the overall behavior and controls impacting LNAPL mobility are similar, the different LNAPL chemistry impacts the potential for LNAPL to act as a source of soil, soil vapor, and groundwater contaminants as discussed in **Section 6.3.3**.

Target compound list constituents comprise very small proportions in all three LNAPL samples. Target SVOCs make up less than 1 percent, and target VOCs make up less than 2 percent. Consistent with historical samples, the primary compounds are polycyclic aromatics (2-methylnaphthalene, naphthalene), monocyclic aromatics (benzene, ethylbenzene, toluene, xylenes), and monocyclic aliphatics (cyclohexane, isopropylbenzene).

SVOC TICs (analyzed for the 2017 samples only) make up 7 percent to 10 percent of the LNAPL and are comprised predominantly of unknown compounds with small individual fractions (all less than 1 percent) of monocyclic aromatics (including m-xylene and o-cumene which are also quantitated as target VOC compounds), polycyclic aromatics, monocyclic aliphatics. VOC TICs make up approximately 1 percent to 5.2 percent of the LNAPL and are comprised predominantly of various methylated benzenes with some monocyclic aliphatics as well. Similar to the SVOC TICs, the individual fractions of VOC TICs are all less than 1 percent. Consistent with the discussion above regarding the low concentrations of polycyclic aromatics in the historical LNAPL samples, the low concentrations and low solubilities of individual TICs limit potential partitioning from the LNAPL.

Concentration ranges for select compounds for samples collected in 1993 to 1995, 2011, 2014, and 2017 are summarized in **Table 6-6** below**.** The range of key VOC and SVOC constituent concentrations have remained relatively consistent in the Seep Area, but have declined significantly in the Former Tank Farm A area. Acknowledging the variability in sample collection methods and analytical and reporting procedures over time (e.g., dilutions, double-counting of constituents via multiple analytical methods), the concentration reductions over time in the Former Tank Farm A area are most likely the result of NSZD of the LNAPL. Only manual LNAPL recovery has been conducted in this area, unlike the Seep Area, so active recovery methods are not likely the cause of the concentration reduction.

Table 6-6: Commonly Detected LNAPL Constituents

Area	Constituent	Concentration Range 1993 – 1995 (mg/L)	Concentration 2011 (mg/L)	Concentration 2014 (mg/L)	Concentration 2017 (mg/L)[1]
Seep Area **1993-1995:** MW-13, MW-21	2-Methylnaphthanlene	610 - 1,800	1,280	325	338
	Naphthalene	3,200 - 6,200	1,280	81	1,410

Area	Constituent	Concentration Range 1993 – 1995 (mg/L)	Concentration 2011 (mg/L)	Concentration 2014 (mg/L)	Concentration 2017 (mg/L)[1]
2014: H-3P **2017:** H-3P	Benzene	5.1 - 570	72	13.6 – 36.3	94
	Ethylbenzene	100 - 1,400	1,680	600 – 1,241	4,136
	Xylenes	860 - 7,500	7,040	3,120 – 5,088	17,907
Former Tank Farm A MW-11	2-Methylnaphthanlene	360 / <1,000	--	--	103
	Naphthalene	600 / 930	--	--	40
	Benzene	6.2 / <31	--	--	4
	Ethylbenzene	86 / 520	--	--	8
	Xylenes	2,500 / 4,600	--	--	6
Former Service Station/Tavern MW-26	2-Methylnaphthanlene	460 J	--	--	--
	Naphthalene	1,600	--	--	--
	Benzene	4.4 J	--	--[2]	--
	Ethylbenzene	11	--	--[2]	--
	Xylenes	420	--	--[2]	--

Notes:
1 – Concentrations converted from mg/kg using the 2017 densities of the respective LNAPL sample
2 – Sample results indicate LNAPL sample was water affected and composition data is compromised

6.3 Distribution and Occurrence

Historically, LNAPL has been observed at the Site in seeps, as free-phase product in monitoring wells and as a residual LNAPL in soils. As described in **Section 2.0**, LNAPL was first observed in the Seep Area near 1 and 5 Foster Avenue in the mid-to late 1980s. Numerous investigations and interim actions have been completed under the oversight of the USEPA and the NJDEP. Interim recovery actions have included installation and operation of a free product recovery/soil vapor extraction (FPR/SVE) system, soil removal, and manual product recovery.

Historical investigations identified Former Tank Farm A as the primary area of LNAPL releases with lateral migration of LNAPL extending downgradient. The FMP RIR used a number of lines of evidence to define the extent of the LNAPL, including (Weston, 2018):

1. Measurement of LNAPL thicknesses in monitoring wells.
2. Soil boring screening methods including visual and olfactory signs of impacts, PID/FID readings, and LNAPL detection dyes to define the presence of residual and mobile LNAPL in the formation.
3. Soil sample collection and analysis for TPH/EPH.
4. MIP and LIF investigations.
5. Soil vapor sample collection and analysis for methane to compare against a screening value indicative of the presence of LNAPL.

The 2017 LNAPL investigation activities were designed to supplement the historical dataset to better define the horizontal and vertical extent of the LNAPL. As presented in Section 4.0, the investigation included additional CPT/MIP locations, conventional soil borings with associated screening and analytical data, high-resolution soil core photography, and petrophysical testing of soil cores.

A hierarchy has been developed for the various lines of evidence based on the confidence level that each line of evidence provides in identifying the presence/absence of LNAPL. Direct evidence of LNAPL, such as the presence of LNAPL in wells, provides a greater degree of certainty than do qualitative and screening level evidence, such as PID/FID readings, which, in turn, provide a greater degree of certainty than do calculated concentration thresholds that may be indicative of LNAPL.

In decreasing order of certainty, the established hierarchy is:

1. Direct measurable evidence of LNAPL:
    a. LNAPL measured in wells
    b. LNAPL pore fluid saturations
2. Qualitative and screening level evidence of LNAPL:
    a. LNAPL sheens or globules visually present in samples and/or photos
    b. Odors and staining
    c. PID/FID responses
    d. MIP/LIF responses
    e. Hydrophobic dyes
3. Calculated thresholds indicative LNAPL:
    a. Effective volatility exceedances for LNAPL constituents
    b. Effective solubility exceedances for LNAPL constituents
    c. Effective soil saturation exceedances for LNAPL constituents

6.3.1 LNAPL Measured in Monitoring and Recovery Wells

Gauging has been conducted as part of routine groundwater sampling events and LNAPL recovery activities. The frequency of LNAPL observations in monitoring and recovery wells and the maximum LNAPL thickness for the periods 2010 through 2013 and 2014 to 2017 are summarized in **Table 6-7** below. This summary table is based on historical gauging data included as **Appendix N**. Hydrographs are included as **Appendix O**.

To facilitate assessment of LNAPL responses to water table fluctuations, the groundwater data for both monitoring and recovery wells have been corrected for the presence of LNAPL using the following formula:

Corrected Depth to Water = Measured Depth to Water – (Product Thickness x Density of LNAPL*)

*A density of 0.80 g/cm^3 has been utilized based on the average value of Site-specific LNAPL densities.

LNAPL has historically been identified at a number of monitoring locations adjacent to Former Tank Farm A, the Former Service Station/Tavern, the former Main Plant area, and the Seep Area (refer to **Figure 4-1** for monitoring locations). These wells include MW-1, MW-11, and MW-12 in the Former Tank Farm A; wells MW-26 and MW-27 on the Former Service Station/Tavern; and wells MW-13/MW-13(R), MW-21, MPMW0009, WP-1, WP-14, H-1P, H-2P, H-3P, SVE-5, SVE-6, and SVE-7 in the LNAPL recovery area south of Foster Road (Seep Area), and MW-15 in the Main Plant Site.

The wells in which measurable LNAPL has been detected since 2010 are shown on **Figure 6-1** with a historical depiction of LNAPL extent from 1995 provided as **Figure 6-2**. As shown by a comparison of the two figures, there has been no expansion in the lateral extent of observed LNAPL since 1995.

The frequency at which LNAPL has been observed (**Table 6-7**) in the majority of the wells has declined from the 2010-2013 time period to the 2014-2017 time period. Most notable are MW-12 (downgradient of Former Tank Farm A), MW-26 (on the Former Service Station/Tavern), and SVE-4, H-1P, and WP-14 (recovery wells in the Seep Area).

Reductions in LNAPL thickness are also observed from 2010-2013 to 2014-2017. For example, notable decreases are observed in MW-12 and WP-14, where no LNAPL has been observed from 2014 to 2017. There are, however, some locations where the frequency and thicknesses of LNAPL detections have remained relatively consistent. These include MW-11 (Former Tank Farm A), MW-27 (on the former Service Station/Tavern), and SVE-5 through SVE-7 and H-3P (recovery wells in the Seep Area).

Wells where the frequency and thickness of LNAPL have remained relatively consistent over time likely reflect limited areas where LNAPL pore fluid saturations remain high enough to enable some LNAPL drainage into the wells. However, the overall stability of the LNAPL plume, reductions in frequency of occurrence, and reductions in LNAPL thickness observed in wells are a function of multiple factors including the termination of Site operations (and therefore the absence of ongoing contributions of LNAPL to the subsurface), the residualization of LNAPL by water table fluctuations (discussed further below), the success of LNAPL recovery activities (**Section 7.1**), and natural degradation processes reducing LNAPL mass (**Section 7.0**).

Table 6-7: Summary of LNAPL in Wells, 2010-2013 to 2014-2017

Well	2010 through 2013		2014 through November 2017	
	LNAPL Observations	Max Thickness and Date	LNAPL Observations	Max Thickness and Date
Site Wide Gauging and Sampling Events				
MW-1	2 of 12	0.02	0 of 9	NA
MW-11	7 of 12	1.05	5 of 9	1.25
MW-12	2 of 12	0.67	0 of 9	NA
MW-13R	1 of 12	0.01	1 of 9	0.07
MW-21	8 of 12	1.32	4 of 9	1.10
MW-26	6 of 12	0.33	2 of 9	1.00
MW-27	3 of 12	0.71	2 of 9	1.06
LNAPL Recovery Operational Gauging				
SVE-1	0 of 41	NA	0 of 44	NA
SVE-2	0 of 41	NA	0 of 43	NA
SVE-3	0 of 39	NA	0 of 34	NA
SVE-4	6 of 41	0.02 (9/2012)	2 of 42	0.01 (11/2015)
SVE-5	30 of 43	1.91 (12/2012)	33 of 43	2.32 (10/2014)
SVE-6	26 of 42	0.99 (2/2013)	23 of 42	1.55 (11/2017)

Well	2010 through 2013		2014 through November 2017	
	LNAPL Observations	Max Thickness and Date	LNAPL Observations	Max Thickness and Date
SVE-7	24 of 42	0.53 (6/2011)	21 of 44	0.52 (8/2014)
SVE-8	0 of 41	NA	0 of 44	NA
SVE-9	2 of 41	0.04 (9/2012)	0 of 41	NA
SVE-10	0 of 40	NA	0 of 42	NA
SVE-11	0 of 41	NA	0 of 42	NA
SVE-12	0 of 41	NA	0 of 42	NA
H-1P	26 of 41	0.06 (8/2010)	12 of 43	0.02 (10/2015)
H-2P	0 of 0	NA	9 of 29	0.39 (11/2016)
H-3P	51 of 51	1.65 (6/2010)	49 of 49	0.60 (7/2014)
H-4P	0 of 0	NA	0 of 1	NA
WP-1	37 of 41	0.99 (03/2011)	31 of 38	1.44 (12/2016)
WP-7	0 of 18	NA	0 of 43	NA
WP-8	0 of 18	NA	0 of 45	NA
WP-14	18 of 27	0.25 (5/2011)	0 of 28	NA
WP-17	0 of 7	NA	1 of 43	0.01 (5/2014)
WP-18	0 of 11	NA	0 of 37	NA
WP-20	0 of 22	NA	0 of 43	NA
WP-21	0 of 22	NA	0 of 43	NA
MW-13R	4 of 21	0.19 (11/2012)	7 of 41	0.12 (11/2016)

Notes:
LNAPL = light non-aqueous phase liquid
NA = not applicable

Dark Shading > 50% of events LNAPL measured or detected
Light Shading >25% of events LNAP measured or detected

Based on the hydrographs (**Appendix O**), LNAPL thickness tends to follow the upward and downward movement of the water table consistent with LNAPL present under unconfined conditions as described in **Section 3.3**. During high-water table conditions, LNAPL thicknesses are low or nonexistent, and during low water table conditions LNAPL thicknesses increase. This occurs because low water table conditions facilitate drainage of LNAPL from the soil pores (where mobile LNAPL fractions are present) when the hydraulic pressure of the groundwater is removed. This is observed at MW-11, MW-12, MW-13R, MW-21, MW-26, and MW-27. The depth interval over which a subsurface LNAPL source has been spread vertically as the water table fluctuates between historical high and low elevations is termed the "smear zone."

The LNAPL thicknesses in MW-11 (**Figure 6-3**) illustrate this typical LNAPL response under unconfined conditions. Although not shown on **Figure 6-3**, this pattern is also observed in other monitoring wells in the Former Tank Farm A area (MW-12), at the Former Service Station/Tavern (MW-26 and MW-27), and in the Seep Area (MW-13R).

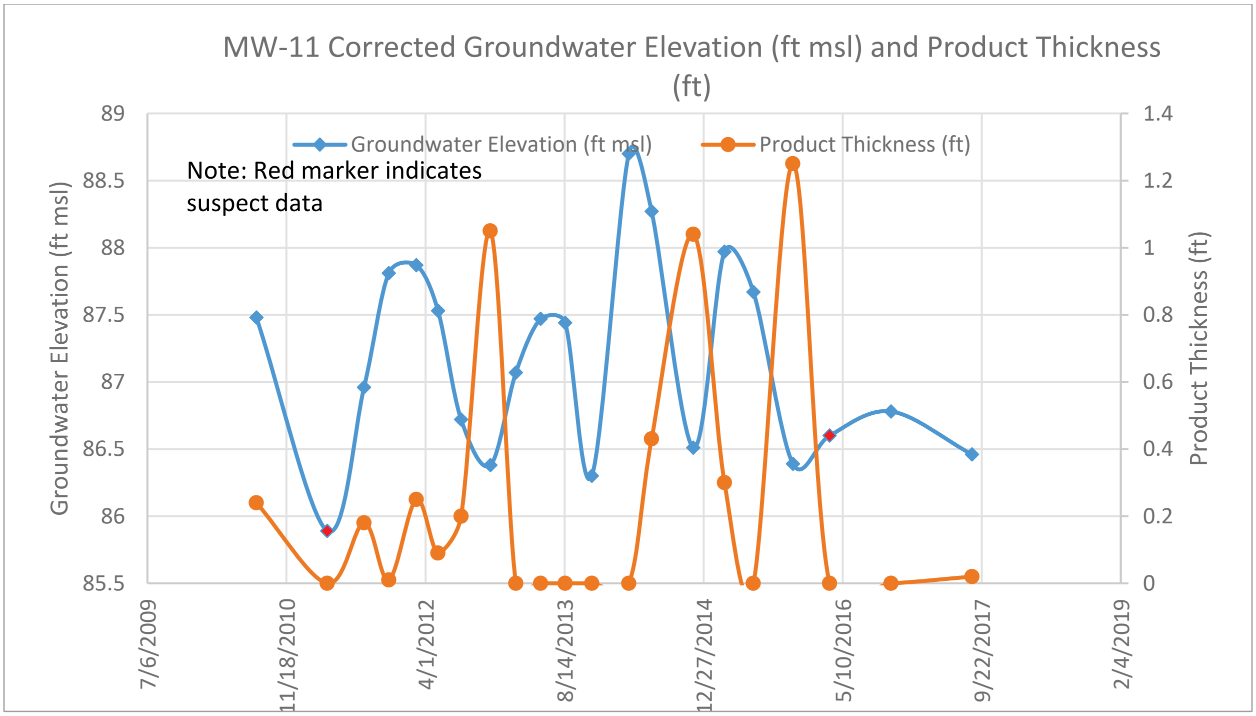


Figure 6-3: Relationship between Groundwater Elevation and LNAPL Thickness in MW-11

The same LNAPL thickness responses to water level fluctuations are evident in the monitoring data for the recovery/remediation wells; however, the responses in the recovery/remediation wells inherently exhibit a smaller amount of variability as a function of recovery activities that affect natural water table fluctuations. Hydrographs of LNAPL elevations and corrected groundwater elevations over time for the recovery wells for the 1997 to 2002 period are provided as **Appendix P**. LNAPL elevations, groundwater elevations, and LNAPL thicknesses (for select wells) for the period from 2010 through 2017 are provided as **Appendix O**.

Figure 6-4 provides a hydrograph for well SVE-5 which shows the correlation between low groundwater elevations and LNAPL thickness. As shown, the LNAPL thicknesses typically increase when water table elevations decrease.

Figure 6-5 provides the hydrograph for recovery well H-3P which does not exhibit such a strong relationship due to active recovery occurring in this well. However, in the case of H-3P a clear trend of declining LNAPL thicknesses over time (despite water table fluctuations) is evident and is likely in response to recovery efforts (both vapor extraction and product recovery) and natural mass losses.

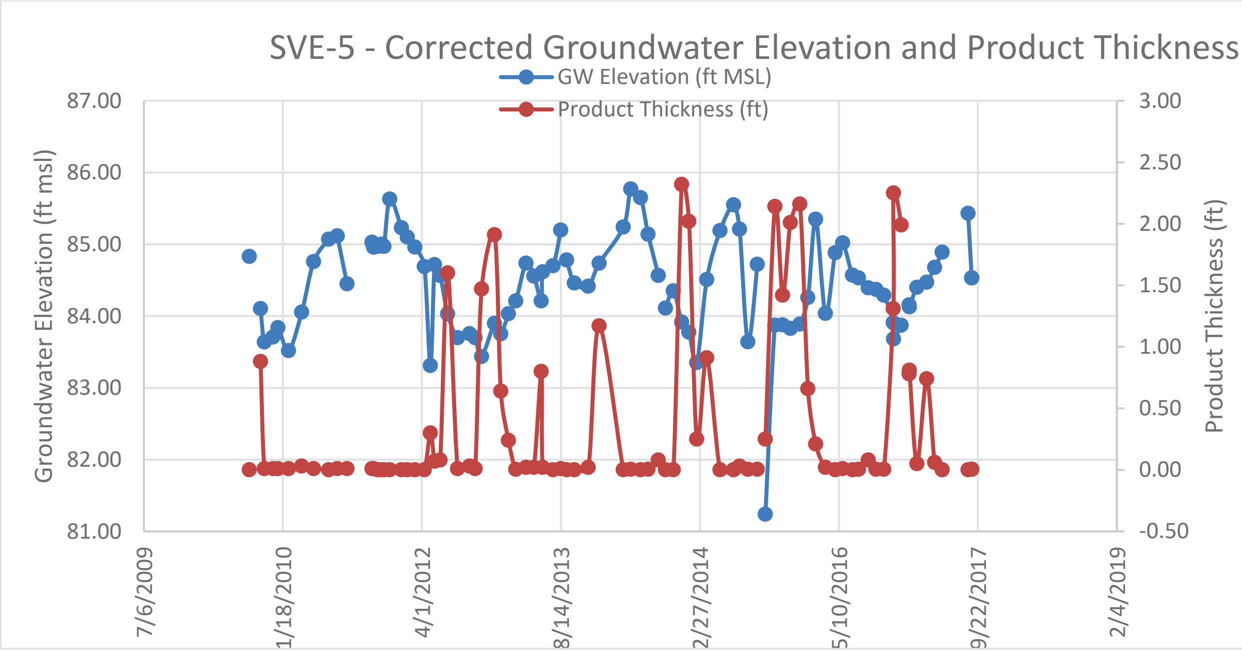


Figure 6-4: Groundwater Elevation and Product Thickness over time in Recovery Well SVE-5

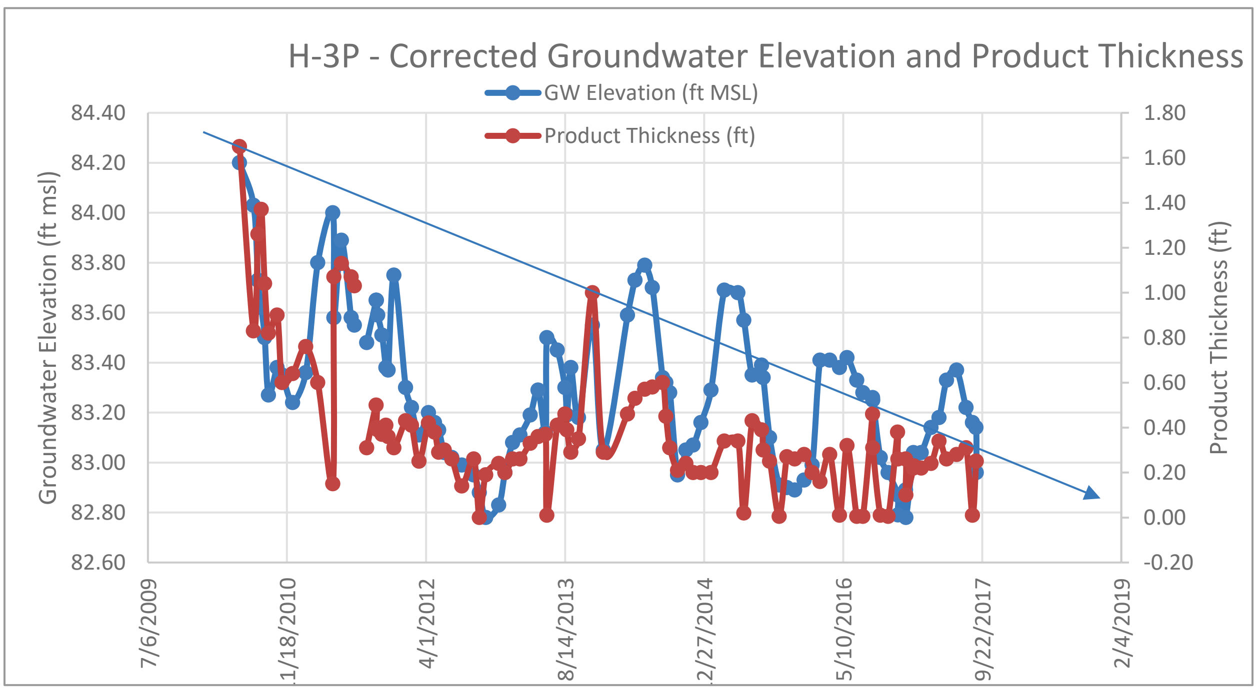


Figure 6-5: Groundwater Elevation and Product Thickness over time in Recovery Well H-3P

As described in **Section 3.3**, the magnitude and frequency of water table fluctuations are important in terms of immobilizing LNAPL as the fluctuations redistribute LNAPL across the smear zone, progressively reducing LNAPL pore fluid saturations over time. Based on the hydrographs, water levels typically fluctuate 2 to 4 feet annually between high and low water table conditions and, as shown on Cross Section

A-A’ (**Figure 5-3**), the difference between historical high and low water table conditions is on the order of 5 feet in some wells.

These processes are evidenced on the hydrographs where lower water table conditions are generally now required before LNAPL starts entering a well in contrast to historical periods when LNAPL drainage responded more rapidly to declining water levels.

6.3.2 LNAPL Pore Fluid Saturations

LNAPL pore fluid saturations are provided in **Table 6-8** and **Table 6-9** (and laboratory reports provided in **Appendix C**) and are shown on **Figure 6-6**. The saturation data provides direct evidence of presence of LNAPL by measuring the percentage of pore space that is occupied by LNAPL in soil samples. As shown, measurable LNAPL was present in all soil cores with saturations ranging from 0.1 percent to 8.7 percent with an average value of 3.1 percent. It is to be noted that the samples selected for petrophysical analysis were from areas where LNAPL was thought to be present based on historical information, so the presence of measurable LNAPL in all samples was expected. Although all LNAPL pore saturation percentages were relatively low, higher measured LNAPL saturation values are located in close proximity to the water level observed during drilling (as noted on **Figure 6-6**). This observation is consistent with the effects of water levels on LNAPL distribution and residualization over time, discussed in **Section 6.3.1**.

The highest LNAPL saturation (8.7 percent) was observed in the sample collected from DP-22 (11.3’-12’) in the Former Tank Farm A area. It is noted that this maximum value is located within the range of historical water levels as shown on Cross Section A-A’ (**Figure 5-3**) and is bounded by lower pore fluid saturations (DP-22 [7.3'-8.0']: 1.4 percent and DP-22 [17.7'-18.3']: 1.5 percent). LNAPL saturations were also observed in the deepest sample from this location (DP-22 [20.5'-21.0']) with a pore fluid saturation of 4.8 percent. This supports the conceptualization (refer to **Section 2.4**) that historical LNAPL heads during the release were sufficient to displace water and drive downward migration of LNAPL below the water table.

6.3.3 LNAPL Presence Based on Qualitative Indicators and Screening Level Data

6.3.3.1 <u>Historical Qualitative Evaluations</u>

In order to initially characterize the nature and extent of the LNAPL-impacted area, a subsurface investigation program was conducted in 2003 (Weston, 2004). This program consisted of two phases, a preliminary characterization and soil screening survey, followed by a confirmatory Geoprobe® investigation coupled with collection of soil samples for laboratory analysis.

A total of 162 locations were included in the initial evaluation (**Figure 6-7**). At each location, visual examination of the soil cores was conducted, and the cores were screened using a combination of PID/FID soil gas readings. Additionally, samples were collected and mixed with a hydrophobic dye (Kolor Kut) to determine if LNAPL was present. The soil screening program provided an initial overall characterization of the extent of LNAPL. Based on this screening investigation, locations for confirmatory soil sampling were selected depending on either the presence of obvious signs of LNAPL (product odor, staining, globules) or the maximum soil vapor readings obtained with the TVA-1000 PID/FID sensors.

The investigations identified a contiguous area of LNAPL impacts extending from the Former Resin Plant/Former Tank Farm A area south into the Seep Area. The extent of LNAPL impacts was also shown to extend eastward towards the Former Service Station/Tavern and southwest toward Hilliards Creek. Observations of staining and globules of oil were observed in soil samples. In addition, the service station and a tank farm adjacent to Hilliards Creek were also identified as potential contributors of LNAPL based on the impacts observed. Evidence of soil impacts was not found in the extreme northern part of the Lacquer Plant (Area E), the northern and southeastern portions of Harbor Linen (Area G), Tank Farm B (Area F), and the southern portion of Goldin Sports (Area A). The results of soil screening indicated that the thicknesses of the most impacted soil zones varied from approximately 6 inches to 12 inches throughout the Site within the vertical fluctuation zone of groundwater consistent with the observations of LNAPL within wells (**Section 6.3.1** and LNAPL pore fluid saturations (**Section 6.3.2**).

Field screening (using a PID) conducted as part of the 2009/2010 Remedial Investigations soil borings indicated the possible presence of LNAPL over relatively large vertical soil intervals in the Seep Area and the Former Resin Plant/Former Tank Farm A area. In some cases, the vertical extent of the elevated PID readings was greater than observed in the MIP investigations described below. The field screening data are summarized in **Figure 6-8a, Figure 6-8b**, and **Figure 6-8c**. The vertical extent of LNAPL reflected in both screening and soil analytical testing (Weston, 2011) suggested the presence of LNAPL well below the water table, which is supported by the LNAPL pore fluid saturations discussed in **Section 6.3.2**.

The field screening data provided the following key observations:

1. In the former Main Plant area, the vertical extent of LNAPL is relatively shallow, extending to a depth of 7 feet bgs. The highest field screening results were observed in locations MPSB0031, MPSB0032, MPSB0033, MPSB0092, and MPSB0093, just west of the 2 and 4 Foster Avenue buildings.
2. In the Former Resin Plant field screening indicators of LNAPL generally extend to a depth of 13 feet (MPSB0009, MPSB0010, and MPSB0011) however at MPSB0004 the field screening suggested that the LNAPL could extend to a depth of 23 feet bgs with two distinct intervals of impact (9.5 to 17 feet bgs and 20.5 to 23 feet bgs).
3. In Tank Farm A, the results suggested that the LNAPL may extend from 2 feet to around 21 feet bgs. The highest PID readings were observed at MPSB0013 and MPSB0017.
4. In the Former Service Station/Tavern area, evidence of LNAPL based on field screening results were generally observed below 8 feet bgs and extended below 20 feet.
5. Adjacent to Hilliards Creek in the Seep Area, elevated field screening results were confined to the upper 8.5 feet (MWSB0041). North of Foster Avenue (MPSB0086) elevated PID readings were observed from near the surface to a depth of 13.5 feet bgs. PID concentrations greater than 500 ppm were observed as deep as 7.5 feet bgs.
6. In the Seep area near MW-13R to MW-21, elevated PID readings were observed between 0.5 feet and 7.5 feet bgs. North of Foster Avenue, elevated PID readings were observed from 7.5 to 13.5 feet bgs and reflect the higher topography in this area. Hydraulic downgradient of the Seep Area, the elevated PID readings were observed at deeper intervals (from 4 to 13.5 feet bgs) and reflect the increasing depth to groundwater.

As part of supplemental investigations conducted in 2012, a hydrophobic dye (Oil Red O) was used to field screen soils for the presence of residual LNAPL at 26 soil boring locations throughout the FMP Site. Positive dye test results suggested the presence of residual LNAPL at six locations (MPSB0099, MPSB0100, MPSB0110, MPSB0111, MPSB0124, and MPSB0125; **Figure 6-9**). All positive dye test results were within 2 feet of the water table.

As discussed in **Section 5.1,** MIP and LIF were used as screening methodologies over broader areas of the Site. Because of the composition of the LNAPL, MIP provided the greatest benefit in defining the lateral and vertical extent of the LNAPL. Given the complimentary nature of historical and current MIP data sets, both data sets are discussed in the supplemental investigation discussion below.

6.3.3.2 2017 Supplemental Investigations

As part of 2017 LNAPL Investigation activities, MIP investigations (based on the historical success of this technology), soil logging, soil vapor headspace measurement in the soil cores, and high-resolution soil core photography were completed on the core section intervals to supplement the direct evidence of NAPL (**Section 6.3.2**) and previous screening level results. The following discusses these various lines of evidence to support an updated understanding of the distribution of LNAPL at the Site. 2017 LNAPL Investigation locations are provided on **Figure 4-1**.

Faint to moderate UV fluorescence (discussed in **Section 6.1** and displayed in the core photography in **Appendix L**) attributed to the presence of LNAPL was observed in soil cores from the Former Resin Plant and Material Storage Area (DP-09 at 7.2 to 8 feet bgs and 8.3 to 9.5 feet bgs), and Hilliards Creek/Seep Area (DP-13 at 3 to 5 feet bgs, DP-14 at 5.8 to 7 feet bgs, DP-17 at 2.8 to 3.8 feet bgs, DP-19 at 3.3 to 4 feet bgs, and DP-20 at 5.5 to 7 feet bgs). These results indicate a greater fraction of aromatic hydrocarbons than was observed at all other locations across the Site. UV florescence is an indicator that LNAPL may be present in the above areas, which is consistent with the conceptualization that LNAPL is noted above and below the groundwater table. More prevalent fluorescence in the Seep Area versus the other 2017 investigation areas correlates with the higher aromatic fraction within the H-3P LNAPL sample (Seep Area) compared to the MW-11 sample (Former Tank Farm A). It should be noted that faint UV florescence was also observed at other areas of the soil cores; however, this is interpreted as fluorescing minerals within the soil cores.

Visual and olfactory signs of LNAPL were noted on the boring logs (**Appendix K**) for all 2017 borings with the exception of DP-10 (Area I; Former Main Plant Area). Specific depths for visual discoloration (staining) were noted in soil cores DP-03 (13 feet bgs), DP-04 (15 feet bgs), DP-05 (11.5 feet bgs), DP-07 (11 feet bgs), DP-20 (7 feet bgs) and aligned with the depth where groundwater was encountered during drilling at all locations.

Given the spatial density of the MIP and headspace readings datasets, they collectively provide the most robust screening level tool in defining the lateral and vertical extent of LNAPL impacts. In addition, the use of historical and recent data enables a temporal evaluation of changes over time. Overall, MIP (PID) responses (shown on **Figures 6-10A** to **6-10G**) are variable across the Site and reflect a combination of variability in LNAPL saturations, chemical composition and weathering. In contrast to the MIP PID sensor responses, the MIP FID sensor responses (also shown on **Figures 6-10A** to **6-10G**) are significantly lower and are typically highest above the water table (within the vadose zone) with the responses attributed to the biogenic production of methane via NSZD processes discussed further in **Section 7.0**.

To focus the discussion on the areas most likely to be impacted by LNAPL, MIP PID sensor responses greater than 15 volts and headspace readings over 300 PPM (consistent with the historical screening criteria; Weston, 2018) were assigned as indicator values. While responses above these values are good indicators of the presence of LNAPL, it is acknowledged that lower responses may also be associated with areas of residual LNAPL as demonstrated by the LNAPL pore fluid saturation data (**Section 6.3.2**); hence the use of multiple lines of evidence is recommended to define the extent of LNAPL.

Soil vapor headspace measurements (**Appendix K**) and the MIP results (**Figure 6-10A** to **Figure 6-10G** and **Appendix B**) consistent with the presence of LNAPL were observed above, at, and below the historical range of groundwater (generally less than approximately 20 feet bgs) across the site. A general pattern of highest MIP (PID sensor) responses (**Figures 6-10A** to **6-10G**) at the groundwater table decreasing with depth and returning to background response levels approximately 5 to 7 feet below the interpreted groundwater level (at the time of drilling) was observed. Soil vapor headspace measurements decreased to less than approximately 25 PPM in deeper soil core intervals consistent with the overall MIP response patterns. The exception to this overall response pattern is associated with MIP locations advanced in the Former Tank Farm A area (**Figure 6-10A**) where responses extend to deeper intervals below the water table.

This is further illustrated on the geologic cross sections (**Figures 5-3** to **5-6**) where areas of peak MIP responses are shown and are observed well below the historical low groundwater elevation. In addition, the cross sections also show some areas where peak responses are observed within and below intervals of finer-grained materials (e.g., CPT-MIP-26) indicating that historical LNAPL migration may have occurred in deeper more coarse-grained units.

Lastly, comparison of the MIP responses from 2012/2013 and 2017 at co-located sites (**Figure 5-3** to **Figure 5-6**) provide an indication of reductions in LNAPL vertical extent over time. These changes are observed at the:

- Former Resin Plant and Material Storage Area: CPT-MIP-04 and CPT-MIP-09 compared to MPSB0172
- Former Tank Farm A: CPT-MIP-18 and CPT-MIP-27 compared to MPSB0162 and MPSB0161
- Main Plant Site: CPT-MIP-11 compared to MPSB0178
- Seep Area: CPT-MIP-14 compared to MPSB0165

Additional discussion by area is provided below:

- In the Former Tank Farm A area (Areas A and B – **Figure 6-10A**) peak responses (greater than 15V) are consistently observed at depths at or below the groundwater table. The vertical interval of peak responses is up to 8 feet thick (CPT-MIP-27) although elevated responses (above baseline) are observed to a depth of around 28 feet bgs. The elevated MIP responses correlate well with the PID responses observed at co-located boring DP-22, where headspace readings greater than 100 PPM (with many higher than 1000 PPM) were observed from approximately 8 feet to 17 feet bgs. The higher responses at depth (below the water table) at CPT-MIP-27 are likely associated with its proximity to the source area, where greater historical LNAPL heads facilitated vertical LNAPL migration below the water table. The historical data also supports this conceptualization with elevated PID responses observed at depth at MPSB0160 and MPSB0161 (located adjacent to Former Tank Farm A as shown on **Figure 6-9**).
- To the west and northwest of Former Tank Farm A (Areas C and I – **Figure 6-10B**) limited MIP responses were observed with the greatest responses in CPT-MIP-07 (maximum response 7.5V) and CPT-MIP-11 (maximum response 5V) at or below the groundwater table. Headspace readings from co-located borings (DP-10 and DP-11, respectively) exhibited peak responses at similar depths to the MIP responses. Maximum headspace readings were 18 PPM at DP-10 at 7.5 ft and ranging from 285 to 605 PPM from 2.5 to 7 ft bgs at DP-11. CPT-MIP-11 and DP-11 are located on the western side of 2 Foster Ave and likely associated with historical lateral spreading of LNAPL from the Former Tank Farm A area. In contrast, CPT-MIP-07 and DP-10 are located further to the northwest of Former Tank Farm A and appear to be located beyond the LNAPL area given the low magnitude responses across a narrow vertical interval.
- To the north of Former Tank Farm A in the Former Resin Plant and Material Storage Area (Area D – **Figure 6-10C**), peak MIP responses were observed at the water table in CPT-MIP-04 and CPT-MIP-08 over a fairly limited vertical interval (1 to 2 feet), with lower responses observed above the water table. Headspace readings from co-located soil borings (DP-08 and DP-09, respectively) also reflect some vadose zone impacts with responses ranging from 300 to 800 PPM from 3 to 10 ft at DP-08 and 150 to 1200 PPM from 4.5 to 9 ft at DP-9. Given the absence of a strong MIP response in CPT-MIP-03 located to the south, elevated vadose zone headspace readings, and the fluorescence observed in the DP-09 core (in contrast to the absence of fluorescence in Former Tank Farm A soil

cores, indicating different LNAPL composition) these responses may be associated with LNAPL unrelated to the Former Tank Farm A area. The spatial extent of LNAPL appears to be relatively limited to the north and east based on the limited MIP responses at CPT-MIP-01 and CPT-MIP-02.

- In the area of the Seep Area recovery wells (Area E – **Figure 6-10D**), MIP responses were observed at and below the water table at depths generally less than 5 feet bgs, consistent with shallow groundwater levels within this area. The exception to this is CPT-MIP-22, located to the east along U.S. Avenue, where the depth to groundwater is greater. Peak responses in this area were generally confined to a 2 to 3-foot interval with the vertical distribution a function of natural water table fluctuations and historical LNAPL recovery activities (which may have resulted in some groundwater drawdown). The strongest responses were observed at CPT-MIP-21 which is proximal to the MW-13R well location. Boring DP-18, co-located with CPTMIP-21, exhibited elevated headspace readings ranging from 310 to 590 PPM between 2.5 to 5.5 ft. Historical MIP investigations conducted in the Seep Area (locations MPSB0165, MPSB0167, MIP-6, MIP- 3, and MPSB0174 shown on **Figure 6-9**) confirmed the presence of impacts in shallow groundwater at depths ranging from 3 to 16 feet bgs. Consistent with the observations within the Former Tank Farm A area, the reduction in the vertical extent of responses over time may indicate a reduction in LNAPL impacts associated with remedial activities and natural source zone depletion processes.
- Downgradient of the Seep Area (Area F – **Figure 6-10E**) MIP responses were limited to two of the four locations (CPT-MIP-24 and CPT-25) located to the west and south of Seep Area recovery activities, respectively. The MIP response pattern is consistent with that observed in the Seep Area discussed above, with peak responses limited to narrow vertical intervals of 2 to 3 ft at and below the water table. Headspace readings from co-located soil borings (DP-19 and DP-20, respectively) correlate closely with MIP responses with readings from 137 to 1170 PPM from 2 to 5 ft bgs at DP-19 and 591 to 1525 PPM from 6 to 9 ft bgs at DP-20. The absence of elevated MIP responses observed at CPT-MIP-12 and CPT-MIP-13 indicates that these locations are beyond the LNAPL area and thus help define the southwestern extent.
- In the western portion of the Seep Area (South of Foster Avenue and proximal to Hilliards Creek, Area K – **Figure 6-10F**) the MIP response patterns are consistent with that observed in the Seep Area discussed, above with peak responses limited to narrow vertical intervals at and below the water table. In addition, MIP responses were generally lower in magnitude potentially reflecting lower LNAPL saturations and/or weathering. The greatest MIP responses were observed in CPT-MIP-16 located close to Foster Avenue. Soil borings proximal to CPT-MIP-16 (DP-13 and DP-14) reflect the MIP responses with readings ranging from 650 to 1250 PPM from 1 to 5 feet bgs at DP-13 and 320 to 1500 PPM from 5 to 7 ft bgs at DP-14.
- To the south of Former Tank Farm A including the Former Service Station/Tavern and off-property areas on the eastern side of US Avenue (Areas G and J – **Figure 6-10G**), MIP responses were observed at and below the water table with peak responses generally within a 5-foot vertical interval. The strongest responses (and greatest vertical interval of responses) were observed at CPT-MIP-35 on the Former Service Station/Tavern property with impacts extending approximately 6 feet below the water table. Soil borings advanced on the Former Service Station/Tavern property include DP-23 and DP-24. Headspace readings from the borings correlate closely with the MIP responses with maximum readings of 680 to 2600 PPM from 12.5 to 15 ft bgs at DP-23 and 125 to 1200 PPM from 10 to 15 ft bgs at DP-24. The absence of elevated MIP responses observed at CPT-MIP-34 and CPT-MIP-36 indicates that these locations are beyond the LNAPL area and thus help define the eastern extent.

As discussed in **Section 5.1**, laboratory grain size analysis, CPT logs, boring logs, and core photography from the 2017 LNAPL investigation in combination with the historical geophysical investigation data provide a clear demonstration of the complexity of site geology with the variability in fines content a key control on historical LNAPL migration and an ongoing factor in low LNAPL mobility (even at a local well-scale). Importantly, the 2017 data (**Table 5-4A and 5-4B**) and historical data (**Figure 5-1**) indicate the presence of finer-grained soils at almost all locations within the historical range of groundwater fluctuations. In addition, the variability is most evident in the seep area where numerous silt units are present near the water table. Further, coarser-grained units are present within the Former Tank Farm A area (e.g., CPT-MIP-27) and may have facilitated historical LNAPL migration into adjacent areas.

6.3.4 LNAPL Presence Based on Partitioning Calculations

As described in **Section 3.5**, LNAPL chemical composition is central to how constituents within the LNAPL will interact with other media. The following section compares the historical and recent (2017) soil vapor, groundwater, and soil data against calculated threshold values for each media as a means of assessing the extent of LNAPL. The phase partitioning calculations presented in **Section 3.5** utilize Site-specific LNAPL physical and chemistry data, Site-specific hydrogeologic data, and literature values for key LNAPL constituents. As discussed previously, these calculations are considered to have the highest degree of uncertainty of all of the lines of evidence regarding the extent of the LNAPL.

It is noted that historical soil data have been used in previous assessments to define the extent of LNAPL, but were based predominantly on a combination of regulatory criteria (e.g., 1,700 mg/kg total EPH is the NJDEP ecological screening value and not associated with potential presence of LNAPL) and/or mobility threshold values (akin to cRes values, not cSat values). The calculations provided herein attempt to further leverage the use of soil vapor, groundwater, and soil data as indicators for the presence of LNAPL.

6.3.4.1 Vapor Phase

As discussed in **Section 6.2**, the current composition of the LNAPL mass is approximately 74 percent to 82 percent aliphatics with less than 2 percent of target constituents within the volatile range. As discussed in **Section 3.5** the relative abundance of a constituent in LNAPL is a limiting factor on the potential soil gas concentration as a result of volatilization from the LNAPL. The threshold soil gas concentration calculations are included in **Table 6-10** and **Table 6-11** for the key compounds identified within the LNAPL samples (including TICs) for MW-11 and H-3P, respectively. Analytical results exceeding the calculated soil vapor threshold values are summarized in **Appendix Q**.

Although these soil gas concentrations represent the *maximum potential* concentrations in soil gas as a result of volatilization from the LNAPL mass into pore spaces immediately adjacent to the LNAPL, these concentrations are not thresholds for soil gas concentrations in the subsurface. Soil gas concentrations at near surface are controlled by both advective and diffusive transport processes and are the result of the cumulative volatilization from multiple sources (e.g., from dissolved and sorbed constituents) that must also be considered as potential contributions to vapor concentrations. Notwithstanding, soil vapor concentrations exceeding these calculated threshold values represent reasonable indicator concentrations above which LNAPL is likely to be present.

As shown on **Figure 6-11**, the extent of soil vapor concentrations exceeding the threshold value for one or more constituents are predominantly located in and downgradient of the Former Tank Farm A area. With the exception of two locations (SGP-011 and SGP-024) there were no exceedances along Foster Avenue and U.S. Avenue south and east of 2 Foster Avenue. It is noted, however, that elevated soil gas concentrations below the calculated thresholds were observed in SGP-21, SGP-23, SGP-25 and SGP-26, located immediately south of the 2 Foster Avenue building on each side of Foster Avenue.

The location of exceedances within and downgradient of the Former Tank Farm A area is consistent with the release conceptualization presented in **Section 2.4,** specifically that historical releases occurred in this area as surficial and near-surface releases. This would lead to the greatest volume of residual LNAPL within the vadose zone, which would contribute to soil vapor concentrations. Away from the release area LNAPL is present across more discrete vertical zones concentrated at the water table (as discussed in **Section 6.3.3**), where there is less potential for volatilization from an LNAPL source (due to the LNAPL being submerged or partially submerged below the water table except during low water table conditions).

The results correlate closely with the broader soil vapor dataset presented in the RIR (Weston, 2018) indicating that LNAPL is likely present beneath 2 and 4 Foster Avenue, but absent beneath 1 Foster Avenue based on sub-slab benzene concentrations. In addition, the results are supported by the screening assessment presented in the RIR (Weston, 2018) using methane soil vapor concentrations in excess of 50,00 $\mu g/m^3$ as an indicator of LNAPL.

6.3.4.2 Aqueous Phase

Consistent with the discussion regarding the threshold soil vapor concentrations above, the relative abundance of a constituent in LNAPL is a limiting factor on the potential aqueous phase concentration as a result of dissolution from the LNAPL. The threshold dissolved-phase concentration calculations are included in **Table 6-10** and **Table 6-11** for the key compounds identified within the LNAPL samples for MW-11 and H-3P, respectively. Analytical results for shallow and shallow-intermediate wells from 2009 to 2017 exceeding the calculated threshold values for H-3P are summarized in **Appendix R**. The H-3P threshold values were used in favor of the MW-11 values because the H-3P sample contained a higher proportion of monoaromatic and polyaromatic compounds than the MW-11 sample, which is more consistent with historical data (**Section 6.2**), and likely to be more representative of LNAPL composition away from the center of the former Tank Farm A area, where natural mass losses (and depletion of volatile and soluble constituents) would be predicted to be greatest.

As discussed in **Section 3.5**, and consistent with the limitations for using soil vapor data as an indicator for the presence of LNAPL, effective solubility calculations consider a simplified case where NAPL (in contact with water) is the only source of dissolution of a given constituent. Therefore, the presence of additional sources (e.g., sorbed contaminant mass or other distinct spills and releases) may over-estimate the extent of LNAPL. Notwithstanding, because groundwater samples are typically collected periodically from developed, permanent monitoring wells, the use of groundwater data as a screening tool has the advantage of including multiple datasets from a given location and therefore has less uncertainty compared to data collected from discrete grab locations (e.g., temporary wells and soil samples).

The groundwater concentrations exceeding the threshold value for one or more constituents are provided on **Figure 6-12** and extend from the Former Resin Plant and Material Storage Area, through Former Tank Farm A area where the LNAPL appears to extend to the southwest through the Seep area and to the southeast through the Former Service Station/Tavern, and Eastern Off-Property area. The distribution of exceedances downgradient reflects the prevailing groundwater flow directions and groundwater divide observed along U.S. Avenue (**Figure 5-11**).

The larger groundwater dataset is consistent with and supplements the soil vapor data discussion in **Section 6.3.4.1** on the broader distribution of LNAPL at or below the water table compared to the vadose zone (in near-source areas only). The distribution also supports the concept that sufficient LNAPL mass was released historically in the perceived former source area (i.e., Former Tank Farm A) to facilitate mounding and radial LNAPL migration away from the source area, followed by migration further downgradient in the direction of groundwater flow. However, it is important to note that while LNAPL was historically present at sufficient saturations for transport, the absence of measurable LNAPL in most of these wells throughout the gauging history (since 2010, as discussed in **Section 6.3.1**) and the low LNAPL pore fluid saturations in all soil cores analyzed (**Section 6.3.2**) supports the conclusion that the extent of LNAPL is stable with no potential for continued LNAPL migration. LNAPL mobility and recoverability is discussed further in **Section 7.0**.

It is noted that exceedances are also present at three wells in the Former Lagoon area. Consistent with the discussion above on the potential over-estimation of LNAPL extent due to additional sources, the Former Lagoon area exceedances are attributed to the former lagoons and are not associated with LNAPL originating at the Tank Farm A area.

This conclusion is supported by the absence of exceedances at wells located between the Seep Area and the Former Lagoon area (MW-03 and MW-06) as well as the difference in constituents exceeding the effective solubility thresholds. As shown in **Appendix R**, constituents exceeding the effective solubility values in the Seep Area, Former Tank Farm A area, Former Service Station/Tavern, and Eastern Off-Property Area include a combination of cyclohexane, methylcyclohexane, naphthalene, methylnaphthalene, and to a lesser extent, isopropylbenzene, and O-xylene. In contrast, constituents exceeding the effective solubility values within the Former Lagoon area are limited to O-xylene and one exceedance of toluene.

6.3.4.3 Sorbed Phase

Consistent with the modified soil-groundwater partition equation presented in **Section 3.5.3** for calculation of effective soil saturation limits, the threshold soil concentrations for evaluation of the presence of LNAPL are dependent on the calculated effective solubility values and are thus subject to the uncertainties cited above for application of effective solubility values for screening of the presence of LNAPL using dissolved phase impacts. In addition, given uncertainties related to the possible presence of other sources of soil impacts, grab sampling procedures for soil, and inherent variability in soil characteristics from location to location, the soil dataset provides lower confidence in determining potential LNAPL extent compared to threshold calculations for soil vapor and groundwater.

The use of Site soil data is further limited due to the low mass fractions of the VOCs and SVOCs present within the LNAPL and resulting calculated effective soil saturation limits that in some cases are orders of magnitude lower than default cSat values and direct contact screening criteria. For example, the calculated effective soil saturation limit for benzene (**Table 6-12**) based on a mole fraction of 0.001 percent (using the MW-11 LNAPL chemistry data) yields an effective solubility of 0.01 mg/kg, two orders of magnitude lower than the NJDEP direct contact screening level of 2 mg/kg. Therefore, use of effective solubility values for the key VOC and SVOC analytes would likely lead to significant overestimates of LNAPL extent. Further, because the presence of LNAPL within the subsurface away from the perceived source areas is limited vertically to the range of historical groundwater fluctuations, only groundwater samples collected within or below this range are appropriate for use in this screening assessment.

Given these limitations, an effective cSat value was calculated for C9-C12 aliphatics based on the significant mass fractions of C9-C12 aliphatics within the LNAPL samples (approximately 78 percent). For reference, the effective soil saturation limits for the key VOC and SVOC compounds identified within the LNAPL are included along with the C9-C12 aliphatics in **Table 6-12.** It is noted that while the calculated effective cSat value for C9 to C12 aliphatics is very low (12.7 mg/kg based on the H-3P sample) it is similar in magnitude to a typical cSat literature value provided for diesel (18 mg/kg; NJDEP, 2010).

Only soil samples collected below a nominal depth of 5.5 ft bgs were incorporated into the screening assessment to exclude samples collected within the unsaturated zone. A nominal depth of 5.5 ft bgs was utilized based on the average minimum groundwater value across the Site based on the historical water levels provided in **Table 5-6**. While groundwater is generally encountered at greater depths than 5.5 ft bgs, some areas of the Site (e.g., Former Resin Plant and Materials Storage Area and Former Tank Farm A) are also interpreted as potential LNAPL source areas and thus the inclusion of some soil data collected within the unsaturated zone reflects potential residual LNAPL trapped above the water table in areas proximal to potential surficial releases. It is noted that shallower samples collected in the Seep Area adjacent to and along Hilliards Creek are also included given the shallow depth to groundwater directly adjacent to the creek.

Given that numerous assumptions were necessary to facilitate a screening assessment to define LNAPL extent based on exceedances of calculated effective cSat values, the soil concentrations exceeding the threshold value are provided as confidence intervals (1-2 times the effective cSat value, 2-5 times the effective cSat value, 5-10 times the effective cSat value, and greater than 10 times the effective cSat value) on **Figure 6-13** as a means of focusing on the areas where LNAPL is most likely to be present. It is noted that because total hydrocarbons have been analyzed using a variety of analytical methods (reported as TPH, EPH, C9-C12 aliphatics) over time, the effective cSat value was compared to whatever data was available. Analytical results exceeding the calculated threshold values are summarized in **Appendix S**.

While applying the effective cSat values requires a number of assumptions, it has the inherent advantage of greater data density relative to the soil vapor and groundwater datasets. As shown on **Figure 6-13**, the greatest frequency of historical exceedances is associated with a similar areal extent as identified via the effective solubility screening assessment (**Section 6.3.4.2**) with impacts exceeding the *>10x the effective cSat* value within the Former Resin Plant and Material Storage area, Former Tank Farm A area, the eastern Seep area, Former Service Station/Tavern, and Eastern Off-Property area.

Exceedances are also associated with the Former Lagoon Area, but consistent with the discussion in **Section 6.3.3**, these exceedances are attributed to separate and distinct sources in this area. Exceedances are also noted within the shallow samples along Hilliards Creek and may reflect residual LNAPL within shallow soils/sediments as a function of historical discharges proximal to the Seep Area and associated downstream transport, rather than direct LNAPL discharges from the subsurface along the course of the stream south of the Seep Area. Support for this is provided by the fact that adjacent samples away from the creek do not exceed cSat. To the west of Hilliards Creek, sporadic exceedances are associated with the Former Main Plant and Tank Farm B areas and again, consistent with the groundwater dataset, suggests that the primary area of LNAPL impacts is within and downgradient of the Former Resin Plant and Material Storage and Former Tank Farm A areas.

6.3.5 Summary of LNAPL Extent Based on Lines of Evidence Approach

Considering the various lines of evidence evaluating the potential presence/absence of LNAPL discussed throughout **Section 6.3** the interpreted lateral extent of the primary LNAPL area is shown on **Figure 6-14**. Based on the multiple lines of evidence, LNAPL is present in the Former Tank Farm A area and Seep Area and extends to the Eastern Off-Property area to the east of U.S. Avenue. It is important to note that the interpreted lateral extent relates only to the presence of residual LNAPL. As discussed previously, multiple lines of evidence indicate that the LNAPL plume is not migrating, a variety of mechanisms are responsible for ongoing mass losses and residualization, and widespread areas of mobile LNAPL are absent with potential mobility limited to discrete areas during periods of average to low groundwater water levels.

Table 6-13 provides a summary of the multiple lines of evidence used to determine the lateral and vertical extent of LNAPL impacts described throughout **Section 6.0**. Consistent with the hierarchy provided above, LNAPL extent has been determined using higher quality data sets where available (including pore fluid saturations, soil headspace screening, and MIP responses) and supplemented with the assessment of partitioning calculations where higher quality data was unavailable. While petrophysical testing has not been conducted throughout all LNAPL-affected areas, where testing has been conducted, petrophysical and chemical analyses have confirmed the presence of LNAPL within the soil matrix.

In general, the multiple lines of evidence provide concurrence on the presence of LNAPL and the vertical interval over which LNAPL impacts are observed. The MIP results are supported by both PID readings, and petrophysical and chemical testing results on the soil cores. While some variability is observed within the data set, this is considered to be a function of soil heterogeneity and the fact that samples for petrophysical and chemical testing could only be collected from proximal intervals (not the same intervals) due to sample size requirements for petrophysical testing.

In the context of the perceived historical LNAPL extent (**Figure 6-7**) there is close agreement with the analysis provided herein further supporting the conclusion that the LNAPL plume is stable.

The data indicate that the vertical extent of the LNAPL is greatest in the vicinity of Tank Farm A (peak responses from the water table to 8 feet below the water table and impacts extending up to 14 feet below the water table) with the remaining areas of the Site having vertical intervals of LNAPL impacts between 2 and 5 feet thick. In all cases the data indicates that the majority of LNAPL impacts are located at or below the water table beneath inaccessible areas such as U.S. Avenue and Foster Avenue, and existing structures. In comparison to historical assessments of vertical extent, there appears to be a reduction based on the 2017 data providing an indication that LNAPL mass is being reduced naturally.

Key controls on vertical LNAPL distribution include proximity to the historical release areas and the percentage of finer-grained soils (silts and clays). Within the Former Tank Farm A area, the thickness of LNAPL is the greatest and reflects the LNAPL release history and plume evolution: that sufficient LNAPL mass was released in the Former Tank Farm A area to spread laterally near the water table interface and also displace water and migrate downward into the saturated zone. Greater soil homogeneity and lower proportions of finer-grained soils in Former Tank Farm A compared to other areas also likely contributed to downward migration of LNAPL within this area. In contrast, the smaller vertical interval of LNAPL, close correlation between the vertical extent of LNAPL and historical water table fluctuations, and greater percentage of fine-grained soil in downgradient and cross-gradient LNAPL areas indicates that LNAPL migration into these areas occurred primarily as a function of lateral LNAPL migration from the upgradient Former Tank Farm A area.

7.0 MOBILITY, RECOVERABILITY, AND RESIDUALIZATION OF LNAPL

Building on the assessment of hydrogeologic controls presented in **Section 5.0** and LNAPL fundamentals (**Section 3.0**), this section assesses current LNAPL mobility and recoverability and ongoing residualization processes that continue to contribute to LNAPL plume stability and natural mass losses. The following lines of evidence were assessed to support this discussion:

- Historical interim LNAPL recovery efforts and impacts of water level fluctuations
- 2017 LNAPL transmissivity testing
- 2017 laboratory LNAPL pore fluid saturation and mobility analyses
- Calculated threshold values indicative of LNAPL mobility leveraging historical soil data and literature values

7.1 Interim LNAPL Recovery Actions and Trends

As part of interim remedial actions, Sherwin-Williams installed a free-phase product recovery and SVE system in the Seep Area in 1997. The initial system startup was conducted in November 1997 with free product recovery pumps installed in December 1997. As the project progressed and LNAPL thicknesses reduced in wells, the recovery pumps were rotated between wells. In 2010 system operations ceased with more recent manual recovery focused on a limited number of wells (H-3P, SVE-5, and SVE-6).

Historical remediation reporting (SVE Progress Report #17) noted that as of December 31, 2002 the systems had recovered approximately 9,147 gallons of product and 44,897 gallons of product/water mix from the Seep Area since the system startup in November 1997. The peak recovery was observed in 2002 (total fluids of 30,779 gallons) and 2003 (total fluids of 30,165 gallons) with a decline observed in 2004 (total fluids of 10,550 gallons) and 2005 (total fluids of 10,098 gallons). After 2005, the recovery rates declined considerably with recovery volumes below 1,000 gallons (total fluids) with the most recent recovery data (2017) indicating only 140 gallons and 90 gallons of total fluids and LNAPL recovered, respectively.

More recent manual recovery data (2010 through 2017) has been collated on a well by well basis and is summarized in **Table 7-1**. It is noted that the recovery data provided in **Table 7-1** represents LNAPL volumes only and thus differs from disposal volumes (which include both LNAPL and water) noted on waste manifests provided in historical submittals. The recovery data for H-3P supports the conceptualizations provided in **Section 6.3.1**, with generally the greatest LNAPL recovery volumes observed either during periods of low groundwater elevations or after periods of large-scale changes in groundwater elevations. Consistent with the discussion of LNAPL measured in wells (**Section 6.3**), large-scale fluctuations in groundwater elevation can provide significant stresses, both increasing the potential for mobilization of the LNAPL (by pore fluid displacement and hence the expression of LNAPL seeps) and residualization of LNAPL in the formation via smearing.

The LNAPL drainage responses observed in the hydrographs within the LNAPL recovery area indicate that the LNAPL in this area may exhibit localized mobility and recoverability. However, the monitoring data and the decreasing observation of LNAPL over time (even during low groundwater elevations) indicate that the mobile/drainable fraction has decreased significantly over time. Further support for the conclusion of limited mobility and recoverability is shown on **Figure 7-1** illustrating the relationship between LNAPL recovery and water levels and the decline in recoverable product over time, even during periods of low water table conditions. As shown in **Table 7-1**, the LNAPL recovery rates at the site and from H-3P have declined over time and are well below historical highs. Further the data indicates that well H-3P is recovering the majority of LNAPL and that limited recoverable LNAPL is present at other well locations.

Table 7-1: Annual LNAPL Recovery Volumes 2010 to 2017

Well	Annual Recovery Volumes (gallons)								Well Totals (gallons)
	2010	2011	2012	2013	2014	2015	2016	2017	
SVE-5	0.0	0.0	4.3	0.5	3.4	6.0	3.6	2.0	19.8
SVE-6	0.0	0.0	0.3	1.3	0.0	0.0	0.0	2.7	4.3
SVE-7	0.0	0.0	0.2	0.0	0.3	0.0	0.0	0.0	0.5
H-2P	0.0	0.0	0.0	0.0	0.0	0.0	13.8	0.0	13.8
H-3P	197.0	565.3	415.4	393.7	426.9	150.3	143.1	85.6	2377.3
WP-1	0.0	0.2	0.3	0.0	0.0	0.4	0.8	0.0	1.7
WP-14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	197.0	565.5	420.5	395.5	430.6	156.7	161.3	90.3	2417.3
	% Recovery of Totals								
SVE-5	0%	0%	1%	0%	1%	4%	2%	2%	0.8%
SVE-6	0%	0%	0%	0%	0%	0%	0%	3%	0.2%
SVE-7	0%	0%	0%	0%	0%	0%	0%	0%	0.0%
H-2P	0%	0%	0%	0%	0%	0%	9%	0%	0.6%
H-3P	100%	100%	99%	100%	99%	96%	89%	95%	98.3%
WP-1	0%	0%	0%	0%	0%	0%	1%	0%	0.1%
WP-14	0%	0%	0%	0%	0%	0%	0%	0%	0.0%

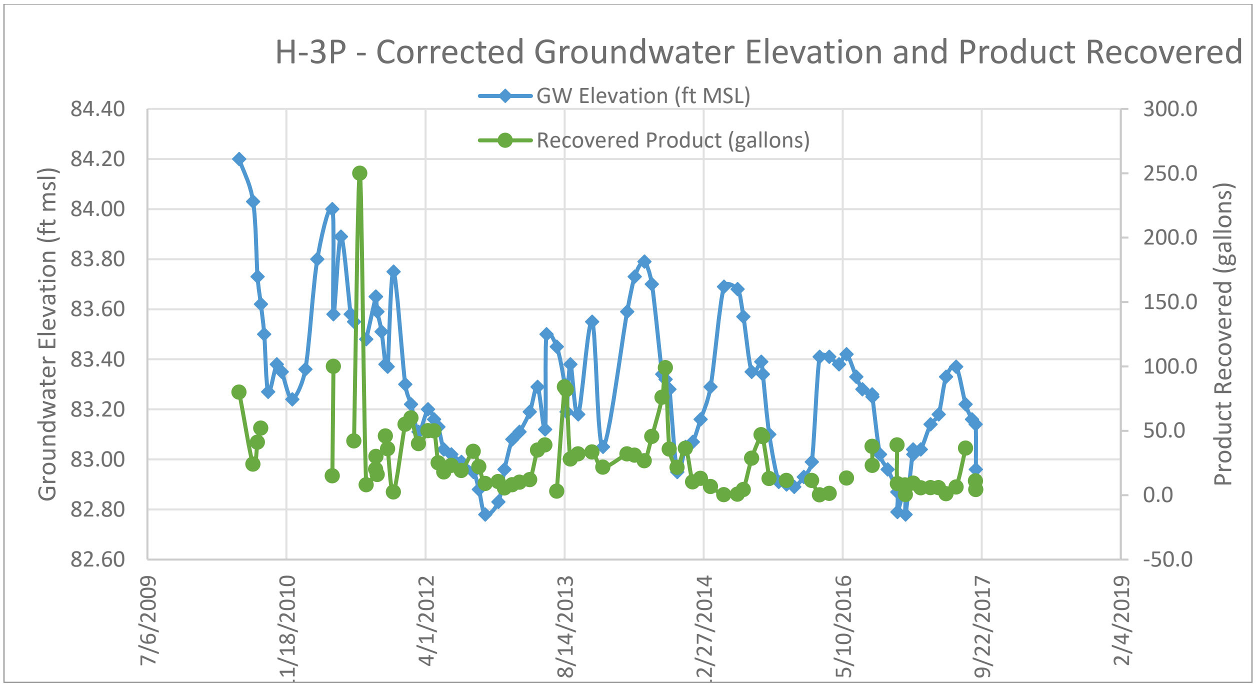


Figure 7-1: Recovery Rates Versus Groundwater Elevation in Recovery Well H-3P

7.2 Assessment of LNAPL Transmissivity and Mobility

The decline in LNAPL recovery rates described in **Section 7.1** is further supported by historical data which indicate that LNAPL transmissivities at the site were considerably higher than currently observed. In July 1995, baildown tests were conducted to estimate the "true" thickness of LNAPL. While this terminology is outdated (this concept was based on the LNAPL pancake theory discussed in **Section 3.2**, which has been reputed), the data provided in Appendix K of the Comprehensive RIR (Weston, 2004) was used to estimate LNAPL transmissivity using historical data discussed in further detail below with initial and post recovery LNAPL thicknesses summarized in **Table 7-2**.

Table 7-2: Historical LNAPL Baildown Test Summary Table

Well Number	Initial LNAPL Thickness (ft)	Duration of Recovery Monitoring (minutes)	LNAPL Thickness at end of Test (ft)
WP-1	1.90	96	0.52
MW-11S	1.16	82	0.27
MW-13R	1.01	35	0.42
MW-21	1.81	80	0.42

As discussed in **Section 3.4**, a key metric in assessing potential LNAPL mobility and the feasibility of LNAPL recovery is LNAPL Transmissivity. The ITRC (2009b) reports that significant LNAPL cannot be recovered and is not at risk of migration at LNAPL transmissivity values of less than 1.4 x 10^{-3} m^2/day based on Becket and Lundergard (1997). However, the ITRC LNAPL team members indicated that based on experience, hydraulic or pneumatic recovery systems may be effective until transmissivity values of between 9.3 x 10^{-3} m^2/day to 7.4 x 10^{-2} m^2/day are observed. Consequently, the LNAPL transmissivity value of 9.3 x 10^{-3} m^2/day has been selected as an appropriate metric for the feasibility of further LNAPL recovery at the site, primarily because the value is based on practical experience from numerous sites.

Assessment of the historical data indicates that LNAPL transmissivities in the four wells evaluated were approximately 1 x 10^{-1} m^2/day and well above the mobility threshold, with the lowest transmissivities observed in MW-21 and the highest in MW-13R. Based on the mobility thresholds described above, the results of the baildown tests provide an indication that historically the LNAPL at the site was mobile and recoverable.

A clear indication of declines in LNAPL transmissivity and recoverability over time is documented in the progress monitoring reports. This is consistent with the general reductions in LNAPL thicknesses that have been observed in wells (considering water table fluctuations) over time (**Section 6.3.1**).

Therefore, to further evaluate current LNAPL transmissivity, baildown testing and stress testing (pumping LNAPL and groundwater) was conducted at MW-11 during the 2017 LNAPL Investigation activities. MW-11 was the only well with sufficient LNAPL [0.15 ft] in 2017 to attempt a baildown test. However, as shown in the field recovery log (**Appendix F**), rebound was not observed and therefore the results did not allow a transmissivity value to be calculated. Given the lack of recharge during the baildown test, a stress test was also conducted at MW-11 (by lowering the water level in the well) in an effort to induce LNAPL discharge into the well. LNAPL recharge was not observed during the stress test as documented in the field notes (**Appendix F**).

The absence of appreciable LNAPL thicknesses, declining LNAPL recovery (even after suppressing water levels), and lack of recharge during recent baildown tests in combination with low LNAPL pore fluid saturations (**Section 6.3.2**) provide a clear indication that the LNAPL at this site exhibits low mobility and recoverability within extremely limited areas and only during low water table conditions.

7.3 Petrophysical Testing of LNAPL Mobility

To provide an additional line of evidence to evaluate LNAPL mobility (and therefore recoverability), sub-samples of the soil cores evaluated for pore fluid saturations were selected for LNAPL mobility testing. As described in the Work Plan (EHS Support, 2017) the mobility testing program assessed potential LNAPL mobility under laboratory conditions under a range of pressures that simulate hydraulic recovery thresholds for LNAPL.

As described in **Section 4.4.3**, mobility testing was biased towards soil core intervals with the highest potential for mobile and recoverable LNAPL based on field observations (i.e., high MIP/PID readings and visual/olfactory signs of LNAPL) and the initial pore fluid saturation testing (**Section 6.3.2**). A total of 11 samples were analyzed for LNAPL mobility using a water drive method to evaluate LNAPL mobility at a range of water saturations and pressures (PTS laboratory reports provided in **Appendix C**). This methodology assesses NAPL mobility in the presence of water and, more critically, the saturated zone, as the majority of LNAPL is present at or below the average water table elevations, as discussed in **Section 6.3**.

As shown on **Table 6-9**, the water/displacing LNAPL residual saturation test showed no changes in LNAPL pore saturations indicating that the LNAPL exhibits no mobility even at the highest observed field saturation of 8.7 percent (DP-22 [11.3-12]). It should be noted that no mobility was observed up to pore pressures of greater than 5 psi (over 6 feet of hydraulic head differential across the core). In comparison, typical capillary pressures exerted by remedial technologies are on the order of 0.5 to 1.0 psi. As such the stresses applied in this testing are considerably higher than can be exerted within natural systems or by LNAPL remediation technologies.

Based on the mobility testing all LNAPL in the soil cores collected at the site are at or below residual saturation with values ranging between 0.1 percent and 8.7 percent. Further, given that no samples exhibited mobility even at pore pressures greater than 5psi, a maximum value of 8.7 percent based on field saturations represent a conservative value for residual LNAPL pore fluid saturations.

7.4 LNAPL Mobility Based on Soil Data

Consistent with the discussion regarding the difference between C_{sat} and C_{res} provided in **Section 3.5.3**, and the LNAPL mobility testing results discussed in **Section 7.3**, derivation of the threshold for potentially mobile LNAPL provides a key line of evidence (in addition to transmissivity, recoverability, and pore-scale mobility data) in assessing the potential for mobile LNAPL. Research by Brost et al. (2000) has shown that residual saturation values can be estimated for general categories of LNAPL type (i.e., gasoline, middle distillates, fuel oil, mineral oil, etc.) within different soil types. As discussed in **Section 3.3**, LNAPL is more likely to be mobile within higher permeability matrices and, as described in **Section 5.1**, there is variability in fines content (silt and clay) observed within the predominantly fine sand matrix at the Site that can significantly impact potential LNAPL mobility.

The threshold LNAPL mobility concentration calculations (i.e., residual LNAPL limits or C_{res}) are included in **Table 7-3** for C9 to C12 aliphatics and are compared to historical and recent soil concentrations for TPH, EPH, and/or C9-C12 aliphatics (depending on available data) (**Appendix T**). For reference, literature values from Brost et al (2000) for middle distillates and gasoline are included in **Table 7-3** and the range in literature C_{res} values for middle distillates aligns closely with Site-specific values.

Concentrations exceeding Site-specific C_{res} values using historical data (2005 to 2016) are provided on **Figure 7-2.** As shown on **Figure 7-2**, potentially mobile LNAPL is limited to a very small number of discrete samples despite the presence of residual LNAPL across a large area of the Site, based on the lines of evidence presented in **Section 6.3**. Further, the 2017 data presented on **Figure 7-3**, illustrates the absence of potentially mobile LNAPL across the Site including areas with historical C_{res} exceedances. Therefore, the reduction in C_{res} exceedances over time support the concept that LNAPL continues to be progressively residualized as a function of water table fluctuations, natural mass depletion mechanisms, and interim remedial actions. Further discussion of natural mass losses is discussed in **Section 8.0**.

8.0 NATURAL MASS LOSSES OF LNAPL AND DISSOLVED PHASE CONSTITUENTS

As described in the previous sections, LNAPL mass at this site is primarily distributed at or below the water table and, in cases of periods of low groundwater elevations, areas of higher saturation may be present above the water table. In this context, mass losses can occur through a range of mechanisms including volatilization into the vadose zone, dissolution, and biodegradation.

The following discussion provides a systematic assessment of natural mass loss processes and associated hydrocarbon mass reduction in both the LNAPL source zone and associated dissolved phase groundwater plume occurring without engineered remediation. The discussion leverages the current understanding of NSZD and natural attenuation processes and the following lines of evidence:

- Natural Source Zone Depletion of LNAPL
    - 2017 groundwater temperature gradients between monitoring wells
    - Historical soil gas data collected within the LNAPL plume area
- Natural Attenuation of Dissolved Phase Impacts
    - Historical VOC concentrations
    - 2017 groundwater geochemistry parameters
    - 2017 microbiology population assessment

8.1 Prospect for Natural Source Zone Depletion

The term MNA as a component of a protective groundwater remedy is well known. The parallel concept of natural attenuation of LNAPL bodies has emerged more recently. A popular term is NSZD, but the term source zone natural attenuation (SZNA) is often used interchangeably.

Advances in measurement of natural LNAPL depletion rates in recent years has led to increased interest in understanding and quantifying natural attenuation of subsurface LNAPL bodies because LNAPL depletion due to gaseous transport in the subsurface has been greatly under-estimated (and under-appreciated) until recent years (Garg, et. al. 2017).

It is clear that a paradigm shift regarding natural depletion of LNAPL bodies has evolved towards appreciating the importance of natural loss of subsurface LNAPL through the soil gas pathway, where abundant LNAPL depletion rates on the order of several hundred to a few thousand gallons/acre/year are typical. Further it is recognized that most natural LNAPL depletion is due to gaseous efflux through the 'vadose' zone (on the order of greater than 90 percent) with the remaining LNAPL depletion being attributable to dissolution in groundwater (Johnson et al., 2006). A modern simplified conceptual model for natural LNAPL depletion is shown below in **Figure 8-1**.

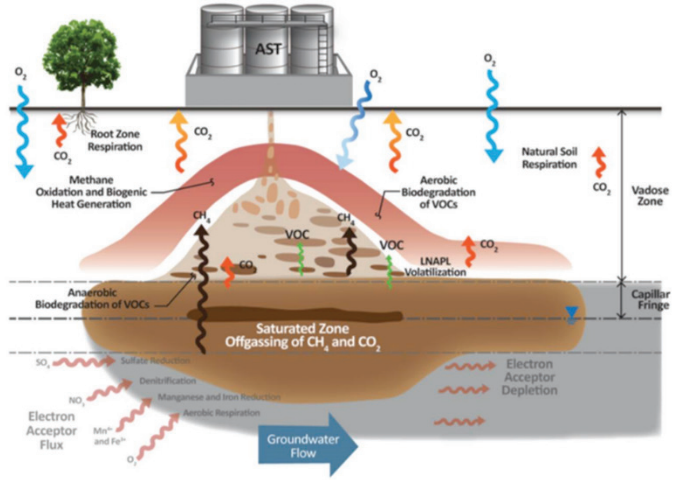


Figure 8-1: NSZD Simplified Conceptual Model

Figure Source: http://www.environmentalrestoration.wiki/index.php?title=Natural_Source_Zone_Depletion_(NSZD)

The ITRC fostered renewed interest in measuring natural LNAPL depletion rates when it published its then-current state of science guidance document in 2009 entitled *Evaluating Natural Source Zone Depletion at Sites with LNAPL* (ITRC, 2009a). ITRC recognized that LNAPL lost to soil gas might be chronically under-appreciated and under-estimated and gave the following conceptual model (**Figure 8-2**) for LNAPL loss through gas transport in the vadose zone.

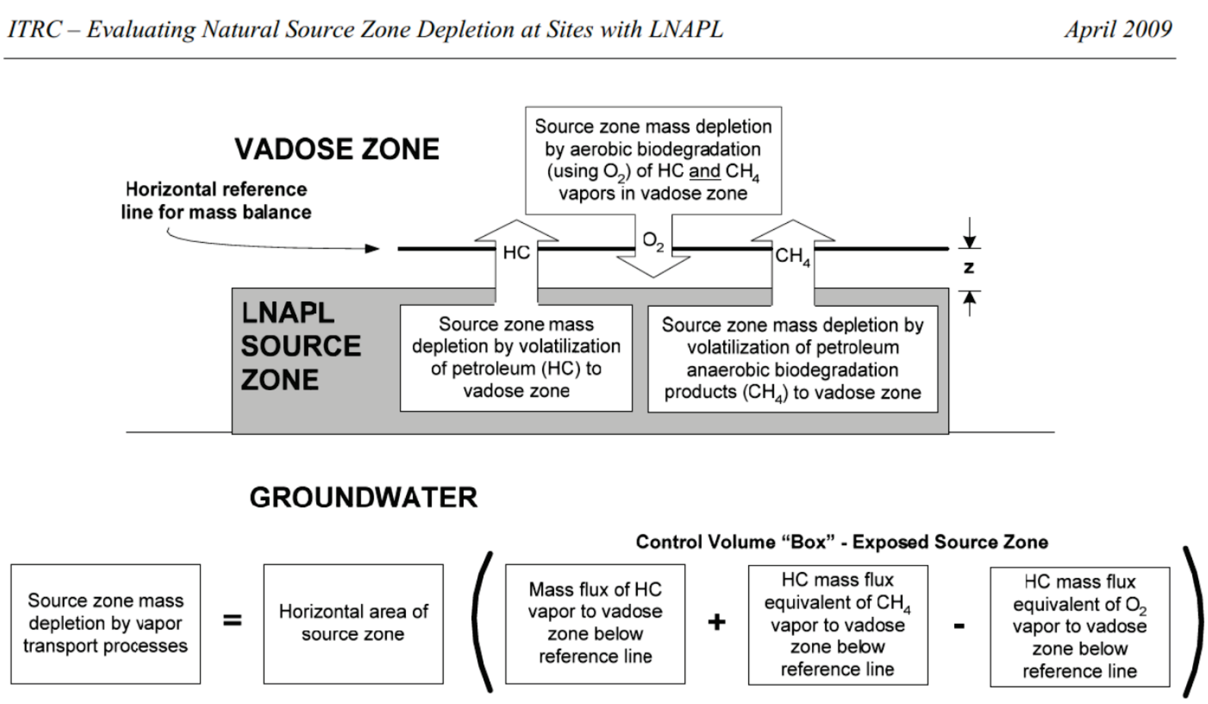


Figure 8-2: Simplified Conceptual NSZD Mass Balance Model

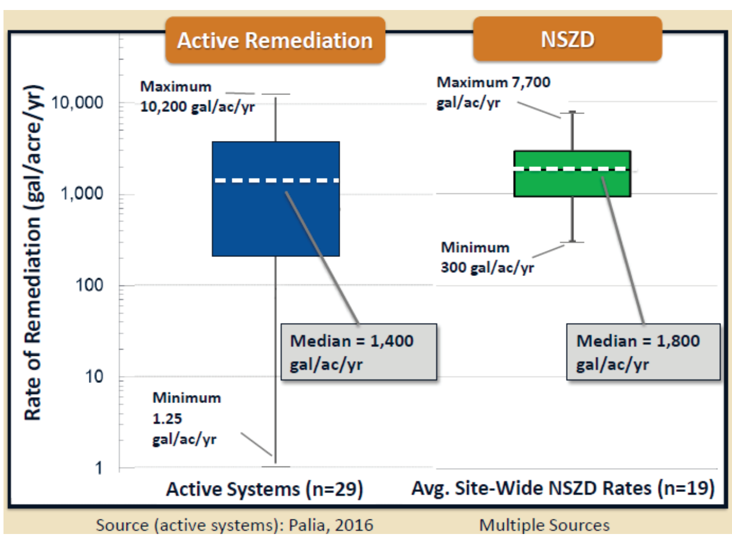
ITRC's adaptation of the work by Johnson et al. (Johnson et al, 2006) provided a means of assessing LNAPL loss by volatilization and gas-phase biodegradation by measuring hydrocarbons, methane, carbon dioxide, and oxygen content across a horizontal control plane near the LNAPL body. This approach is well-suited to the Site as a robust soil gas data set is available (as measured by USEPA in June 2016) (Weston, 2018). A detailed discussion of historical soil gas investigations (including sampling methodologies) and a compilation of data is contained in the FMP RIR (Weston, 2018).

Suthersan et al. (2015) and McCoy et al. (2015) have confidently concluded that past estimates of natural LNAPL depletion have been greatly under-estimated because of an under-appreciation of the relatively large amount of natural LNAPL depletion that occurs in the vadose zone and the role of methanogenesis. Further, the Naval Facilities Engineering Command issued new guidance on "New Developments in LNAPL Site Management" (April 2017) also referencing the following key studies.

Typical measured rates of natural LNAPL depletion rates due to losses to soil gas losses are:

- 134 to 1,340 gallons/acre/year Sites n=1 Lundegard and Johnson (2006)
- 1,600 gallons/acre/year Sites n=1 Sihota et al. (2011)
- 2,100 to 7,700 gallons/acre/year Sites n=1 McCoy et al. (2015)
- 1,100 to 1,700 gallons/acre/year Sites n=1 Los Angeles LNAPL Workgroup (2015)
- 300 to 3,100 gallons/acre/year Sites n=5 Piontek et al. (2014)
- 1,400 to 14,000 gallons/acre/year Sites n=1 McCoy et al. (2015)
- 300 to 7,700 gallons/acre/year Sites n=11 Palaia (2016)

These estimates on other projects have been compared to more active source remediation alternatives and served as a basis to determine if enhanced bioremediation (through additions of amendments) may hold merit. Palaia (2016) has given the following example of such a comparison (**Figure 8-3**):



Newell et al., Presentation to FRTR 11/02/2016

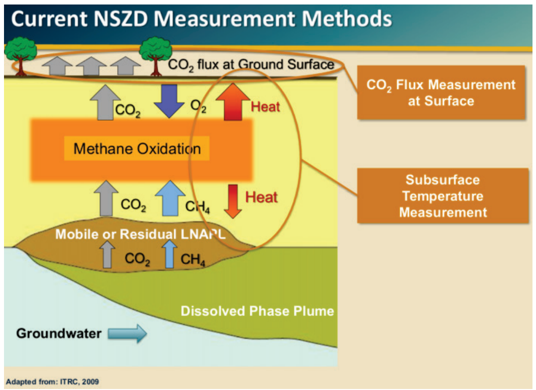
Figure 8-3: Comparison of Mass Losses Between Active and Natural Source Remediation

The science of assessing NSZD is evolving with recent additions to assessment methods including (**Figure 8-4**):

1. Measurement of biogenic gaseous methane and carbon dioxide flux with Flux Chamber methods like Dynamic Closed Chamber samplers or, for carbon dioxide only, with passive

samplers such as CO_2 Traps, Map-Traps, and Fossil Fuel-Traps offered by E-Flux; http://soilgasflux.com.

2. Measurement of temperature rise near source zones attributable to biogenic (metabolic) heat resulting from robust biodegradation in the vicinity of source material such as that offered by Thermal NSZD; https://www.thermalnszd.com.



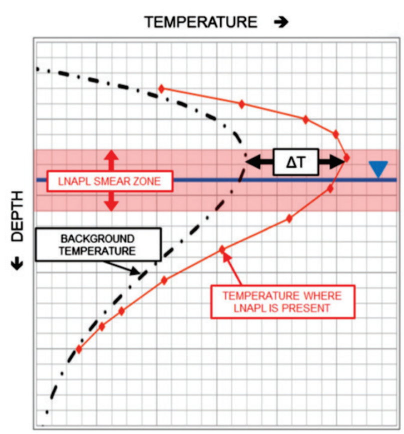
(Source: Newell, 2016)

Figure 8-4: NSZD Measurement Methods

The utility of using thermal gradient (temperature) measurements to accurately and inexpensively assess LNAPL depletion is gaining traction, as evidenced by recent abundant technical publications on the subject:

- Garg et al., 2017
- Newell et al, 2016
- Southersan, 2015
- Stockwell, 2015
- Warren and Bekins, 2015
- Sweeney and Ririe, 2014

The concept behind using thermal gradients is illustrated on **Figure 8-5**.



Source: Southersan, 2015

Figure 8-5: Thermal Gradient Conceptualization

Likewise, the utility of using passive soil gas efflux monitors continues to evolve (E-Flux; http://soilgasflux.com). However, the CO_2 -Trap version may suffer from underestimation of LNAPL depletion rates at sites where biogenic methane gas is incompletely oxidized to CO_2 gas by the time it reaches the near-surface planted passive samplers.

Eichert et al. (2017) compared variability of NSZD rates measured by three different soil gas measurement tools:

- Dynamic Closed Chamber (DCC)
- Concentration Gradient Method (CGM)
- CO_2 Traps (passive near-surface sampler)

In this study, they found the concentration gradient method applied to shallow probes showed relatively low variability compared to the other test methods.

Existing data for the Site affords two ways to get a sense for the abundance of natural LNAPL depletion at the site: soil gas efflux and biogenic (metabolic) heat signature in groundwater. For soil gas efflux, the findings of Eichert et al. support the use of USEPA's 2016 soil vapor dataset and specifically the "soil gas probe" (SGP) sample set. For biogenic (metabolic) heat signature in groundwater, multiple recent publications support the use of groundwater temperature records from the 2017 groundwater sampling event.

8.1.1 Biogenic (Metabolic) Heat Signature in Groundwater

Groundwater temperatures measured at the end of low-flow purging were captured from well sampling log sheets for groundwater samples collected October 10 – 12, 2017 and are summarized in **Table 8-1** below:

Table 8-1: Biogenic (Metabolic) Heat Signature, Groundwater October 2017

Well ID	Functional Position	Temperature	ΔT[1] (relative to background MW-SCAR)
		°C	°C
MW-SCAR	Background	18	0
MW-28	Background	19	0
MW-12	LNAPL Area	22	5
MW-11	LNAPL Area	20	3
MW-13R	LNAPL Area	22	4
MW-26	LNAPL Area	21	3
MPMW-0009	LNAPL Area	26	8
MW-1	LNAPL Area (Distal Crossgradient)	19	0
MPMW-0008	LNAPL Area (Distal Downgradient)	16	0
MW-06	Downgradient Dissolved Phase Plume	19	1
MW-03	Downgradient Dissolved Phase Plume	19	1
MW-04	Far Downgradient Dissolved Phase Plume	17	0

Note: 1 - Negative temperature changes interpreted as no change relative to background

Net temperature change (ΔT; delta T) used to express metabolic heat flux signatures is simply the difference in a well's groundwater temperature and the temperature of its companion background well ($\Delta T = T_i - T_b$, where Ti is temperature of well i, and Tb is temperature of background well).

Evidence of a biogenic (metabolic) heat signature is shown on **Figure 8-6**, below. The net groundwater temperature change is charted along the groundwater flowpath from background, through (in or beneath) the LNAPL area, and further along the nominal centerline and flanks of the hydrocarbons plume.

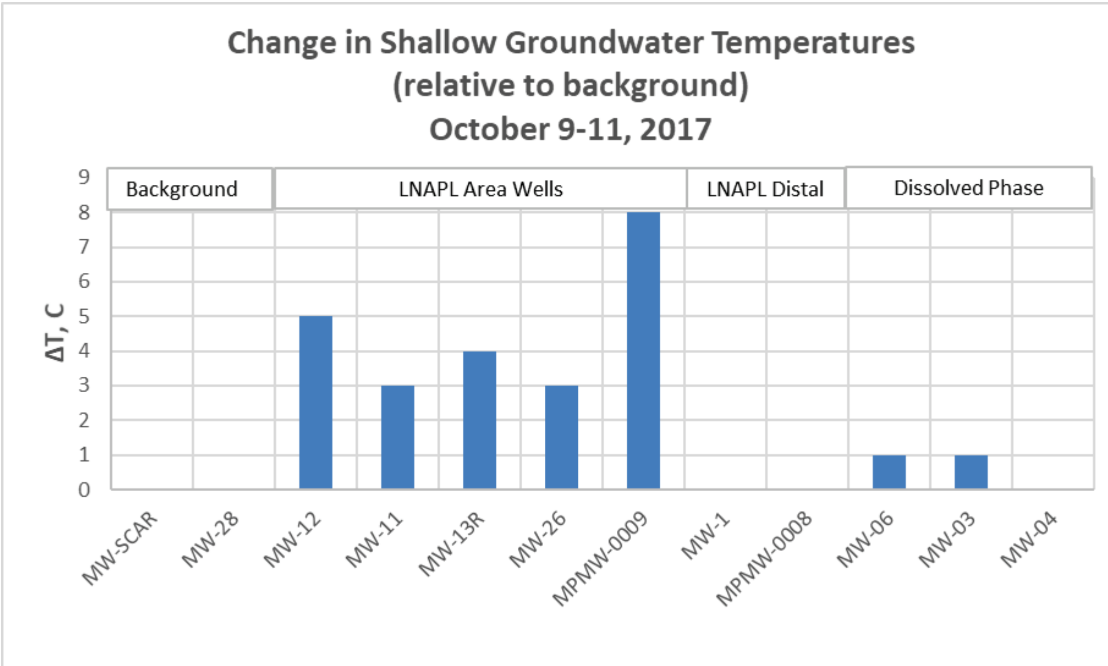


Figure 8-6: Metabolic Heat Signature in Groundwater

As shown, the metabolic heat inspired by robust microbiological degradation of hydrocarbons appears to be evidenced by measurable increases in groundwater temperature in the vicinity of the LNAPL area and its higher-strength hydrocarbon plumes. Therefore, temperature gradients provide one line of evidence for robust NSZD.

8.1.2 Soil Gas Efflux in Vadose Zone

As described in **Section 3.5.1**, LNAPL constituents are subject to volatilization into the vadose zone where these gaseous hydrocarbons are subject to biodegradation. As the biodegradation of hydrocarbons proceeds, methane (via methanogenesis) and carbon dioxide (via aerobic respiration, nitrate/ferric iron/sulfate/manganese reduction and methanogenesis) are produced. In addition, and as further discussed in **Section 8.2**, methane and carbon dioxide are also produced via LNAPL and dissolved-phase degradation within the saturated zone. The produced methane and carbon dioxide are subsequently volatilized from groundwater into the vadose zone. Therefore, the presence of methane and carbon dioxide above baseline concentrations within the vadose zone provides a strong line of evidence that hydrocarbon degradation and mass loss are occurring. The mixture of gaseous undegraded hydrocarbons (e.g., VOCs or VPH and excluding methane), biogenic methane, and biogenic carbon dioxide tend to migrate towards land surface by concentration gradient-driven diffusion and barometric pumping.

The equation for total LNAPL lost to soil gas is:

Total LNAPL Lost to Soil Gas (mass or volume/unit time) = ∑ Losses (Undegraded Hydrocarbons + Biogenic Methane + Biogenic Carbon Dioxide)

The terminology is defined here for clarity:

- **Undegraded Hydrocarbons** = Gaseous hydrocarbons originating from LNAPL body, as-eluted or as partial breakdown products, that have yet to be degraded to methane or carbon dioxide.
- **Biogenic Methane** = Gaseous CH_4 originating from degradation of gaseous hydrocarbons that originated from the LNAPL body.
- **Biogenic Carbon Dioxide** = Gaseous CO_2 originating from degradation of gaseous hydrocarbons or gaseous biogenic methane that originated from the LNAPL body.

This is illustrated conceptually in **Figure 8-1** (undegraded hydrocarbons represented as 'VOCs').

Results of major initiatives to sample and analyze soil gas near the LNAPL body are reported in FMP RIR (Weston, 2018) and summarized on **Figure 8-7** to **Figure 8-9**. These initiatives include:

- Sub-Slab (SS) Probes, 08/26/2015, n = 11, measured immediately below concrete sab
- Monitoring Well Headspace, 06/27/2016, n = 26, measured at undetermined feet above water table
- SGPs, 06/29/2016, n = 27, measured 1 to 2 feet above water table

Lari et al. (2017) investigated whether groundwater monitoring wells screened across the water table can be sampled to yield representative indicators of soil gas composition. They found that low-rate gas extraction from short-screened wells provided satisfactory results. High-rate gas extraction and longer-screen wells returned less accuracy and precision than the low-rate short-screened counterparts. This work suggests that low-flow collection of soil gas from short, unflooded monitoring well screens, like those at the Site, should be reasonably comparable to soil gas captured from short-screened soil gas probes placed 1 to 2 feet above the water table.

As shown on **Figure 8-7** to **Figure 8-9**, SGPs and monitoring well headspaces (for those wells screened across the water table) both measured soil gases in close proximity at nearly the same point in time, indicating the data collected from the SGPs and the monitoring well headspace samples are reasonably comparable. This conclusion is corroborated by reasonable match of the methane, carbon dioxide results found in SGPs and MW headspace measured with two days of each other.

The mean hydrocarbon makeup of the SGP samples is shown on **Figure 8-10** below and reflects the LNAPL chemistry discussed in **Section 6.2** with key volatile constituents including BTEX, cyclohexane, methylcyclohexane, and straight-chain aliphatics. It should be noted that due to elevated reporting limits (due to the interference posed by other hydrocarbons) a number of other COCs are reported as non-detect and as such the mass flux into the vapor phase is underestimated.

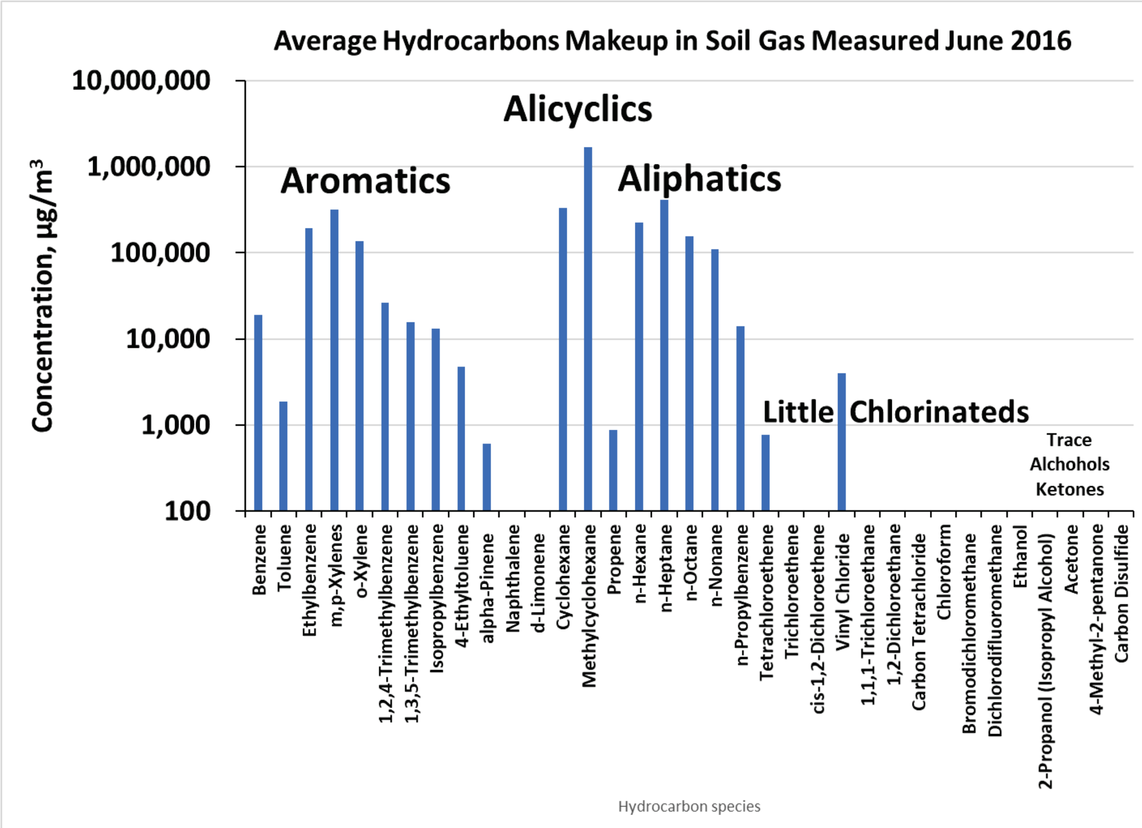


Figure 8-10: Average Hydrocarbons Makeup in Soil Gas Measured June 2016

Consistent with ITRC guidance (ITRC, 2009a), LNAPL mass depletion can be quantified using undegraded hydrocarbons, biogenic methane, and biogenic carbon dioxide data. While the data qualitatively provides strong indications of volatile mass losses and methanogenesis, vertically discrete data from multiple depths are not available to support quantification of methane and carbon dioxide mass fluxes. Based on the limited organic matter observed in soil samples (**Table 5-3C**) it is considered reasonable to assume that the contributions of natural organic carbon to biogenic methane and carbon dioxide production is negligible and thus elevated levels of biogenic methane and carbon dioxide reflect degradation of hydrocarbons from LNAPL.

As shown on **Figure 8-7** and **Figure 8-8**, the magnitude of soil gas concentrations from sub-slab samples and SGPs correlates closely with the magnitude of key LNAPL constituent (benzene and naphthalene) concentrations with the highest concentrations observed in the Former Tank Farm A area (2 Foster Avenue) and lower concentrations observed both upgradient (northwestern portion of 4 Foster Avenue) and downgradient in the Seep Area (1 and 5 Foster Avenue) and Former Service Station/Tavern. The difference in the magnitude in concentrations reflects both the lateral extent of the LNAPL (residual LNAPL is not present beneath the northwestern portion of 4 Foster Avenue) and the vertical distribution of impacts (while residual LNAPL has been identified in the Seep Area and Former Service Station/Tavern area, it is present predominantly at and below the water table in contrast to Former Tank Farm A area where LNAPL is also present in the vadose zone).

The correlation between methane and VOC concentrations is also evidenced in the monitoring well headspace readings (**Figure 8-9**). The headspace screening data also indicates that carbon dioxide levels are elevated and oxygen levels are depressed in areas of elevated VOCs and methane. Therefore, in addition to the production of biogenic methane via methanogenesis, biogenic carbon dioxide is being produced via aerobic respiration (although other processes such as nitrate/ferric iron/sulfate/manganese reduction and methanogenesis may also contribute to the production of biogenic carbon dioxide). The higher concentrations of methane in relation to carbon dioxide suggests that methanogenesis is the dominant LNAPL mass loss process.

Therefore, given the absence of other significant sources of methane and carbon dioxide (as discussed above organic carbon content in soil is very low) the soil gas data provides an additional line of evidence for robust NSZD.

8.2 Assessment of Natural Attenuation in Groundwater

While **Section 8.1** focused on natural mass loss mechanisms from LNAPL itself (predominantly via volatilization and subsequent biodegradation), **Section 8.2** focuses on natural degradation of soluble LNAPL constituents within groundwater. As described in **Section 4.5**, assessment of the degradation of dissolved groundwater plume constituents was divided into two phases to utilize data collected from the first phase to further define the scope for the second phase:

- Phase I (Geochemistry, Biochemistry, and Microbial Assessment)
- Phase II (Assessment and Quantification of In-situ Biodegradation Rates)

Results of the Phase I (Geochemistry, Biochemistry, and Microbial Assessment) initiative and their interpretation are presented below. While Phase I data was collected from both shallow zone and deep zone monitoring wells, the evaluation presented herein focuses on the shallow zone based on the limited vertical distribution of LNAPL impacts. Deep zone results will be provided as part of a separate submittal.

The first phase of the testing program was designed to further define the general geochemistry, biochemistry, and microbial biology within the groundwater plume to validate the processes currently identified that are contributing to the natural degradation of the identified dissolved phase petroleum hydrocarbons. In addition, the scope of work assessed potential key limitations to biodegradation which may be considered as part of future evaluation of potential bio-enhancement approaches. The objectives of the Phase I work efforts were as follows:

- Characterize the current geochemistry and biochemistry within the groundwater plume to allow direct comparison with the microbiological analyses (using groundwater samples).
- Validate and describe the processes contributing to biodegradation of petroleum hydrocarbons by evaluating the type of petroleum-degrading bacteria present at the Site (through the use of QuantArray-Petroleum Analysis on Bio-Trap samplers).
- Quantify the population densities of petroleum degraders and determine if these densities are sufficient to support meaningful intrinsic biodegradation in the groundwater plume area into the future (through the use of QuantArray-Petroleum Analysis on Bio-Trap samplers).

Groundwater sampling to support the natural degradation program was completed in part to assess the prospect for protective natural attenuation according to the multiple lines of evidence (LOE) approach prescribed by USEPA's Policy Directive entitled *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites* (OSWER Directive Number 9200.4-17P; USEPA-540-R-99-009) dated April 21, 1999.

As described in **Section 4.5**, groundwater was sampled October 9-11, 2017 along the nominal centerline (and flanks) of the LNAPL plume. BioTrap passive samples were installed on October 12, 2017 and were harvested December 13, 2017 for a 62-day incubation (soak) duration. In addition, the 2017 dataset was supplemented by historical data to evaluate dissolved-phase plume stability over time. The shallow and intermediate zone wells used for this assessment are listed below in **Table 8-2** and shown on **Figure 8-11**.

Table 8-2: Natural Degradation Program Shallow Zone Monitoring Network

Screened Zone	Well ID	Functional Position
Shallow	MW-SCAR	Background
	MW-28	Background
	MW-12	LNAPL Area
	MW-11	LNAPL Area
	MW-13R	LNAPL Area
	MW-26	LNAPL Area
	MPMW0009	LNAPL Area
	MW-1	LNAPL Area (Distal Crossgradient)
	MPMW0008	LNAPL Area (Distal Downgradient)
	MW-06	Downgradient Dissolved Phase Plume
	MW-03	Downgradient Dissolved Phase Plume
	MW-04	Far Downgradient Dissolved Phase Plume

Groundwater was evaluated for parameters necessary and sufficient to assess the prospect of natural attenuation according to the multiple LOE approach prescribed by USEPA's Policy Directive (USEPA, 1999):

1. Tier 1 LOE - Historical groundwater data that demonstrate a clear and meaningful trend of decreasing (or stable) contaminant mass and/or concentration over time at appropriate monitoring points:
   - Historical VOC data collected from the following monitoring wells located beyond the extent of LNAPL impacts:
     - Cross-gradient: MW-14, MW-29, and MPMW0032
     - Downgradient: MW-3 and MW-6

2. Tier 2 LOE - Hydrogeologic and geochemical data that can be used to demonstrate indirectly the type(s) of natural attenuation processes active at the site, and the rate at which such processes will reduce contaminant concentrations to required levels:
   - Field Measured Analytes:
     - DO
     - Oxidation Reduction Potential (ORP; Ag/AgCl electrode)
     - pH
     - Temperature
     - Specific Conductance
     - Turbidity
   - Biogeochemical Analytes:
     - Non-toxic hydrocarbon degradation products:
       - Methane
       - Carbon dioxide
     - Electron acceptors (and indicators):

- DO
- Nitrate/Nitrite
- Dissolved Manganese (Mn^{2+})
- Dissolved Iron (Fe^{2+})
- Sulfate/Sulfide

o Other Analytes:
- DOC
- Alkalinity

3. Tier 3 LOE – Data from field or microcosm studies (conducted in or with actual contaminated site media) which directly demonstrate the occurrence of a particular natural attenuation process at the site and its ability to degrade the contaminants of concern (typically used to demonstrate biological degradation processes only):
   - Bio-Trap passive sampler analyses were selected based on historical knowledge of LNAPL composition and Site COPCs. The Bio-Traps were analyzed at a subset of wells for the suite of DNA-based microbial/enzyme targets shown on **Table 8-3** below:

Table 8-3: DNA-based Microbial/Enzyme Targets

Analyte Moniker	Analyte	Mechanism	Typical Metabolic Targets
EBAC	Total Eubacteria	All	Many Organic Compounds
ALKB	Alkane Monooxygenase (1)	Aerobic	n-Alkanes C5 to C16
ALMA	Alkane Monooxygenase (2)	Aerobic	n-Alkanes C20 to C32
BPH4	Biphenyl/Isopropylbenzene Dioxygenase	Aerobic	Benzene, Isopropylbenzene
EDO	Ethylbenzene/Isopropylbenzene Dioxygenase	Aerobic	Alkylbenzenes like TEX
NAH	Naphthalene Dioxygenase	Aerobic	PAHs
NidA	Naphthalene-inducible Dioxygenase	Aerobic	Heavy PAHs and Alkanes
PHE	Phenol Hydroxylase	Aerobic	Aromatic Hydrocarbons
PHNA	Phenanthrene Dioxygenase	Aerobic	PAHs
PM1	*Methylibium petroliphilum PM1*	Aerobic	MTBE, TBA
RDEG	Toluene 2-Monooxygenase/Phenol Hydroxylase	Aerobic	Alkylbenzenes like TEX
RMO	Toluene Ring-Hydroxylating Monooxygenases	Aerobic	Alkylbenzenes like TEX
TBA	TBA Monooxygenase	Aerobic	tert-Butyl Alcohol (TBA)
TOD	Toluene/Benzene Dioxygenase	Aerobic	Aromatic Hydrocarbons
TOL	Xylene/Toluene Monooxygenase	Aerobic	Alkylbenzenes like TEX
abcA	Benzene Carboxylase	Anaerobic	Benzene
ANC	Naphthalene Carboxylase	Anaerobic	Naphthalene
APS	Sulfate-Reducing Bacteria	Anaerobic	Most Hydrocarbons
assA	Alklysuccinate Synthase	Anaerobic	n-Alkanes C6 to >C18
BCR	Benzoyl Coenzyme A Reductase	Anaerobic	Aromatic Hydrocarbons
bssA	Benzylsuccinate Synthase	Anaerobic	Alkylbenzenes like TEX
mnssA	Naphthylmethylsuccinate Synthase	Anaerobic	Methylnaphthalenes

Analytical results for Phase I (Geochemistry, Biochemistry, and Microbial Assessment) of the Natural Degradation Testing Program from samples collected in October 2017 are summarized in **Table 8-4** and **Table 8-5**, with laboratory analytical reports included in **Appendix H** and **Appendix I.**

Analytical results for Phase II tasks were initiated in February 2018 and a supplemental technical memorandum was prepared to summarize results from this phase of the work (**Appendix J**).

8.2.1 Tier 1 LOE – Dissolved Hydrocarbons Behavior

Historical Site information (as provided in **Section 2.0**) indicates that Site operations ceased approximately 40 years ago and thus the primary sources of potential additional releases to the subsurface were removed (e.g., tank farms, manufacturing and storage areas). In addition, as discussed in **Section 6.0** and **Section 7.0,** the extent of LNAPL impacts (the primary source of impacts to shallow groundwater) are well defined, the LNAPL plume is stable and is predominantly non-mobile. Further, the total mass of LNAPL (and importantly the volatile and soluble constituents) continue to be depleted through interim actions (**Section 7.0**) and natural mass losses (**Section 8.1**).

Given the age of the LNAPL plume, groundwater and LNAPL are in equilibrium with one another. As described in **Section 3.5.2**, continued partitioning from LNAPL into groundwater is governed by the solubility of the constituent of interest and its relative abundance within the LNAPL (Raoult's law). Therefore, a stable groundwater plume (i.e., not expanding or increasing in total contaminant mass) proximal to a stable LNAPL plume should exhibit declining or relatively constant concentrations over time. Declining concentrations within groundwater may reflect a combination of factors including depletion of soluble constituents from the LNAPL mass and thus reduced partitioning (as evidenced by the LNAPL chemistry at MW-11 over time; **Section 6.2**) and/or natural mass losses of dissolved-phase constituents exceeding the rate of partitioning from the LNAPL. Likewise, stable conditions may reflect relatively consistent LNAPL composition and thus partitioning (as evidenced by the LNAPL chemistry at H-3P over time; **Section 6.2**) and/or equilibrium between the rates of natural mass losses of dissolved-phase constituents and partitioning from the LNAPL.

Therefore, to evaluate groundwater plume stability, concentration trends for key constituents of interest (benzene, cyclohexane, and total VOC TICs, where detected) were assessed for the following monitoring wells selected based on their proximity to (but beyond) the LNAPL area and sampling history (of at least three data points collected):

- Cross-gradient: MW-14 and MW-29
- Downgradient: MW-3 and MW-6

Well locations are shown on **Figure 8-11** and trend graphs are provided on **Figure 8-12** through **Figure 8-15**. As shown on the trend graphs for all of the wells, all constituents (including total TICs) exhibit relatively stable or decreasing trends over a span of at least 4 years (and as long as 22 years in the case of MW-3). In addition, the concentrations of benzene and cyclohexane are low (below 12 parts per billion at all wells over time), supporting the findings of the effective solubility threshold assessment (**Section 6.3.4,**) that LNAPL is not a source of high concentrations of individual constituents to groundwater.

Therefore, USEPA's Tier 1 line of evidence supporting demonstration of plume stability is satisfied.

8.2.2 Tier 2 LOE – Geochemical Behavior

To demonstrate favorable geochemical conditions, the following provides a summary description of how the general water quality parameters, electron acceptors/donors, and degradation bi-products (dissolved gases) are assessed:

Nitrate/nitrite, sulfate/sulfite, iron, and manganese concentrations all provide information regarding the redox conditions of groundwater and bioavailability of electron acceptors/donors. ORP and pH are important in measuring the redox conditions; many biological processes, especially anaerobic, are pH-sensitive. DOC is an indicator of available carbon substrate for bacterial activity. Alkalinity is both an indicator of the buffering capacity of the aquifer as well as evidence of biodegradation (as carbon dioxide is produced and enters groundwater) (ITRC, 2009a). Dissolved gases such as methane and carbon dioxide provide clear evidence of bacterial activity associated with anaerobic biodegradation. In general, interpretation is made by comparing results against background.

Summary results for the biogeochemical constituents and parameters in groundwater sampled October 9-12, 2017 are provided in **Table 8-4** and discussed below:

- **General Water Quality Conditions**:
  - Within and downgradient of the LNAPL area, pH is near-neutral (5.6-6.6 standard units) at all wells, suggesting that there is no microbial toxic inhibition as a result of pH. It is noted that pH is low (3.6 standard units) at background wells MW-SCAR and MW-28 and may be a function of the low organic content (**Table 5-3C**) and low buffering capacity of the shallow zone as evidenced by non-detectable alkalinity levels at these locations.
  - In comparison, increased alkalinity and DOC within the plume wells (aside from MW-11) provides an indicator of biogenic carbon dioxide and dissolved inorganic carbon production and associated reactions with the aquifer materials.
  - Temperatures are within the range tolerated by petroleum-degrading bacteria: 0° to 40° Celsius with biogenic (metabolic) temperature increases observed within the LNAPL area providing additional evidence for degradation (as discussed in **Section 8.1**).
  - Conductivity is notable from the standpoint that the values from MW-11 are one to two orders of magnitude lower than all other wells and may indicate proximity to a source of fresh water recharge to the system.
- **Redox Conditions and Electron Acceptors/Donors**: Reducing conditions prevail within and downgradient of the LNAPL area s, as evidenced by generally low oxygen levels, negative ORP, production of biogenic dissolved iron, and depleted sulfate levels. This is because an influx of oxygen, via recharge, is depleted through aerobic degradation processes. MW-11 is the lone exception where oxidizing conditions appear to persist and, as discussed above, may indicate that it is located proximal to a source of fresh water recharge to the system. Based on the relative concentrations of electron acceptors/donors within the plume area compared to background, dominant processes include iron reduction and sulfate reduction with no evidence for denitrification and manganese reduction (as no concentration gradients are observed between background and plume wells).
- **Dissolved Gases:** Dissolved methane and dissolved carbon dioxide are generally elevated with respect to background with the LNAPL area (aside from MW-11, which exhibits anomalous geochemical characteristics as discussed above) providing evidence for the degradation of dissolved phase and potentially LNAPL within the saturated zone. The presence of methane with and downgradient of the LNAPL plume indicates that methanogenesis is also an important degradation process (in addition to iron and sulfate reduction). Further, it is noted that carbon dioxide concentrations are greater than methane concentrations in groundwater in contrast to the concentrations observed in soil gas (**Figure 8-9**; where methane concentrations are higher than

carbon dioxide). The shift concentrations between media are likely a function of several factors including:

- Methane is less dense and has a lower Henry's Law Constant than carbon dioxide, reflecting the greater propensity for methane to exist in a gaseous phase compared to carbon dioxide (i.e., biogenic methane produced within the saturated zone will not remain in solution and will preferentially migrate into soil gas compared to carbon dioxide).
- Carbon dioxide can be produced via a range of degradation processes (via aerobic respiration, nitrate/ferric iron/sulfate/manganese reduction and methanogenesis) while methane can only be produced via methanogenesis. Therefore, the greater proportions of carbon dioxide compared to methane is also supported by the findings discussed above, that iron and sulfate reduction are significant degradation processes in addition to methanogenesis within the saturated zone.
- Carbon dioxide can also be produced via other natural geochemical processes such as those related to pH and the buffering capacity of aquifer systems (i.e., carbonate, bicarbonate, carbonic acid, and carbon dioxide reactions). However, given the low organic carbon content and low pH and alkalinity observed in the background well (MW-SCAR) these processes appear to be limited at the Site.

Based on the geochemical data collected as part of the 2017 assessment, USEPA's Tier 2 line of evidence supporting demonstration that anaerobic processes are degrading petroleum hydrocarbons and forming biodegradation by-products including methane and carbon dioxide is clearly met. A more detailed discussion of redox conditions providing further support for this conclusion is discussed below.

The comparison of redox potential is commonly used to evaluate the potential for a particular microbiological reductive degradation process to occur. The 'normal' ORP ranges that inform differentiation of the various 'common' anaerobic biodegradation pathways are usually derived at theoretical pH 7. However, redox processes are pH sensitive. So, for sites like this one that have groundwater pH that depart from circumneutral, it is informative to account for pH and measured ORP to define the microbially-favored redox condition at any particular well.

Figure 8-16 shows the measured redox potential and pH during October 2017 in relation to the favored reductive process. **Figure 8-17** summarizes the most likely reductive process(es) that may be occurring at each groundwater monitoring location. For example, based on the pH and redox potential reported from monitoring location MW-13R, the conditions appear to be conducive for iron reduction, sulfate reduction, and methanogenesis. These plots further support the geochemistry results summarized above and indicate that a combination of dominant processes contribute to biodegradation within the saturated zone including anaerobic iron reduction, anaerobic sulfate reduction, and anaerobic methanogenesis.

Figure 8-16: Oxidation Reduction Potential (Eh) versus pH in Groundwater (September to December 2017 data)

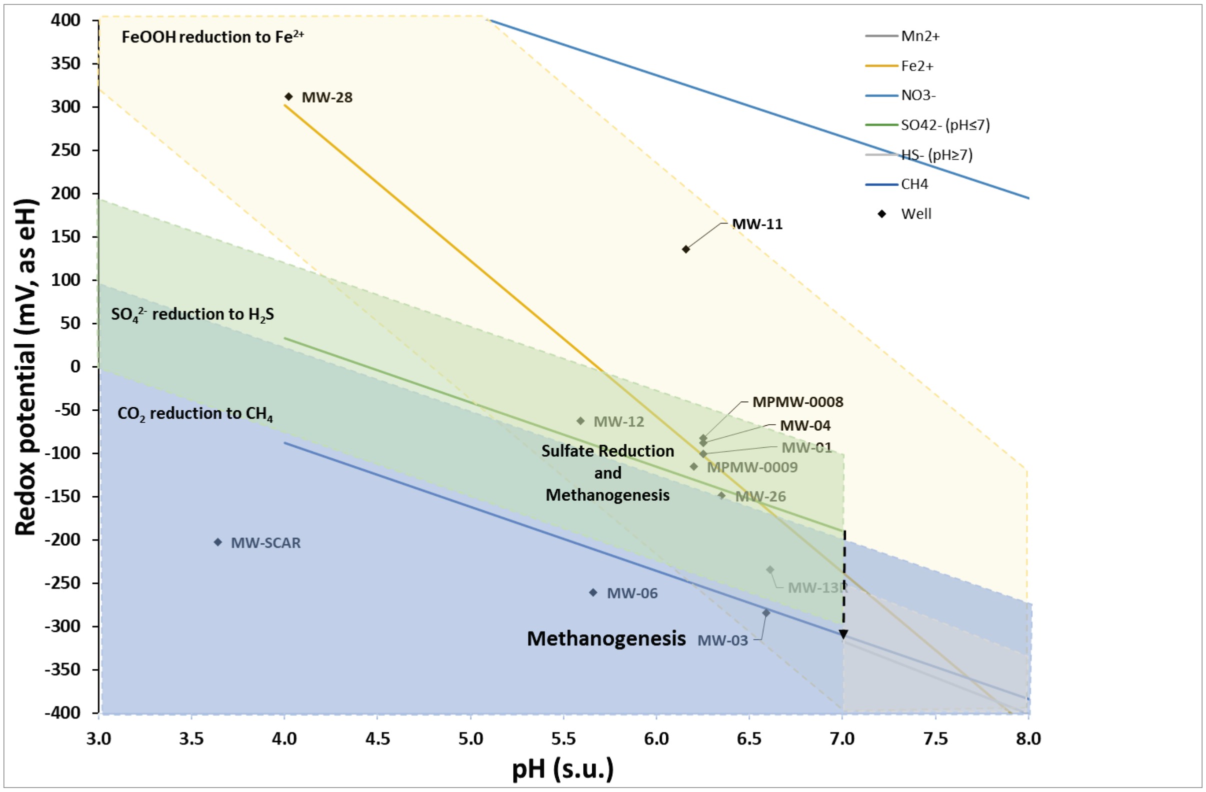


Figure 8-17: Preferential Reductive Processes in Groundwater based on Redox Potential and pH

8.2.3 *Tier 3 LOE – Microbial Behavior*

The QuantArray Testing analytical method (QuantArray-Petroleum Suite) uses DNA microarrays and qPCR to quantify the specific functional genes responsible for both aerobic and anaerobic biodegradation of BTEX, PAHs, and a variety of short and long chain alkanes. Biological activity is generally restricted to the aqueous phase, although a number of bacterial species (for example aerobic degraders such as *Pseudomonas or Sulfate Reducing Bacteria*) form bio-surfactants/bio-enzymes that enable some degradation in water/oil mixtures. Based on this, the highest bacterial populations are generally observed within areas of elevated hydrocarbon constituent concentrations (within the former source areas), but may also occur on the fringes of the plume (where concentrations are lower and bacteria are degrading the flux of constituents from upgradient areas). Bacterial population densities reflect whether geochemistry is conducive to their presence (for example presence of electron acceptors), the presence of organic carbon and the presence of macro and micro-nutrients which are important for biological functions and enumeration.

Detected microbial assessment results are tabulated on **Table 8-5,** a summary and ranking of results (based on **Table 8-5** information) are provided in **Table 8-6** below, and laboratory reports are provided in **Appendix H**. The results have been organized to include wells with bacterial cell densities of meaningful concentrations. The very low (v low), low, moderate (mod), high, and very high (v high) ranking interpretations of the dominant microbial biomarkers noted on the table are interpreted based on Microbial Insights summary database conclusions (comparing bacterial counts from other sites), as well as based on comparative concentrations with other biomarkers. These ranking do not indicate the absence of degradation but rather an indication of bacterial activity.

Table 8-6: Tier 3 Line of Evidence, Microbial Behavior: Summary and Ranking

Screened Zone	Well ID	Functional Position	Microbial Character (Measured on Bio-Traps December 2017)				
			Dominant Biomarkers				
			Anaerobic				Aerobic
			EBAC	APS	BCR	abcA	TOD
Shallow	MW-SCAR	Background	Low				
	MW-12	LNAPL Area	Mod	Mod			v High
	MW-11	LNAPL Area	Mod	Mod		Low	
	MW-13R	LNAPL Area	v Low	Mod	v High		
	MW-26	LNAPL Area	Low			Mod	
	MPMW0009	LNAPL Area	Mod			Low	v High
	MW-03	Downgradient Dissolved Phase Plume	v Low				

Notes: abcA = benzene carboxylase
APS = sulfate-reducing bacteria
BCR = benzoyl coenzyme A reductase
EBAC = eutrophic bacterial populations
TOD = toluene/benzene dioxygenase

These data directly demonstrate the variability in biological conditions in the subsurface. Higher total bacterial populations (EBAC) are observed in source area wells such as MW-11 and MW-12 where the availability of carbon sources (the presence of LNAPL) as well as electron acceptors from upgradient areas make conditions more conducive to biological growth. The EBAC bacterial counts (**Table 8-5**) are greater than 10,000,000 cells per bead, indicating robust bacterial communities available in this area of the site. Low and very low EBAC biomarkers (but still more than 1,000,000 cells per bead) were observed downgradient of the LNAPL area (MW-3), where carbon sources and electron acceptors are more limited. The presence of non-specialized EBAC are expected given the wide range of hydrocarbons present within groundwater within the LNAPL area (polycyclic aromatics, monocyclic aromatics, monocyclic aliphatics, and straight-chain aliphatics).

Consistent with the geochemical conditions, which indicate groundwater geochemistry is conducive to sulfate reduction, sulfate reducing bacteria are present at moderate population densities (15,300 to 53,100 cells per bead) within the NAPL source areas wells (MW-11, MW-12 and MW-13R) although degradation rates are likely constrained by the flux of electron acceptors (sulfate) from upgradient areas.

Within the plume where EBAC population densities were lower (e.g. MW-13R), specialized bacterial communities such as sulfate-reducing bacteria (APS) and benzoyl coenzyme A reductase (BCR) were present at more robust counts, indicating that more specified bacteria may be out-competing the EBAC in certain areas of the plume. In addition, results from MW-12 and MPMW0009 clearly indicate the presence of toluene/benzene dioxygenase (TOD), an aerobic biomarker, suggesting that aerobic degradation is also an important degradation process (via rapid depletion oxygen supplied to the shallow zone via recharge). The overall moderate to low population density may be a function of geochemical conditions (low nutrient flux can have an impact on population density) and/or the overall small fraction of soluble LNAPL constituents (i.e., there is limited carbon [food] sources for the microorganisms). Notwithstanding, the variety of microbial analytes identified in the various wells is consistent with the variety of degradation processes identified in **Section 8.2.2** and provides support for USEPA's Tier 3 line of evidence of meaningful natural attenuation of hydrocarbons in groundwater.

As summarized in **Appendix J**, the Phase II assessment [Stable Isotope Probing (SIP) study] was conducted from February to April 2018 to confirm degradation of petroleum hydrocarbons is occurring in shallow zone groundwater at the Site. The SIP study used benzene as the "bait" for Bio-Traps placed in groundwater wells located at the LNAPL Areas (Former Tank Farm A and U.S Avenue/Seep Area) (MW-11, MW-12, MW-13R, MPMW0009, and MW-26) because of the availability of carbon 13 (^{13}C)- labeled benzene and its suitability for use as a surrogate for assessing biodegradability of other petroleum hydrocarbons detected in LNAPL and groundwater.

The results from the SIP study (**Appendix J**) clearly showed that mineralization of benzene (direct evidence of benzene degradation) was evident in shallow groundwater. Both SIP Bio-Traps at MW-11 (Former Tank Farm A area where LNAPL is present) and MPMW0009 (downgradient to Former Tank Farm A at the Seep Area) showed positive "Delta" (ϭ) in the dissolved inorganic carbon (DIC) as ^{13}C mass. Lower, but still positive ϭ was reported in the DIC in the other three wells (MW-12, MW-13R, and MW-26). When the ϭ in the sample is positive for DIC, it shows that the ^{13}C has been used by the microorganism as energy. Under natural background conditions, the ϭ for DIC it is typically negative (based on literature values).

The results of the ^{13}C enriched PLFA also showed biodegradation of benzene in groundwater associated with the incorporation of ^{13}C into cellular biomass. The ϭ for ^{13}C enriched PLFA in all wells was positive (as compared to negative background conditions) providing clear evidence that the ^{13}C enriched benzene was incorporated into the microbial mass. Mass loss of ^{13}C benzene from the Bio-Traps (observed in all wells) and, in the context of the conversion into DIC and accumulation in PLFA, indicates that this loss is due to biodegradation. Reductions of mass by approximately a third were observed in all wells, thus supports the mineralization of benzene in the aquifer.

The PLFA community structures were identified with the presence of robust populations of hydrocarbon degrading bacteria and align with the QuantArray Testing results. General hydrocarbon degraders (proteobacteria) were the most abundant. Both the variety of microbial analytes (identified in the QuantArray Testing) and identification of direct benzene biodegradation (identified in the SIP Testing) are consistent with the variety of degradation processes identified in **Section 8.2.2,** and provides support for USEPA's Tier 3 line of evidence of meaningful natural attenuation of hydrocarbons in groundwater.

8.3 Summary of Natural Mass Loss Mechanisms

There are multiple lines of strong evidence that natural degradation of LNAPL mass and dissolved hydrocarbons is occurring in the vadose zone and saturated zone. The key mechanisms of mass losses include volatilization and subsequent degradation within the vadose zone, dissolution into groundwater and biodegradation in the dissolved-phase, and potentially direct degradation of LNAPL through cleavage of aliphatic compounds and subsequent degradation of lower carbon chain by-products. Supplemental investigations involving the installation of multi-level soil gas probes could be installed to quantify mass losses in accordance with the ITRC (2009a) assessment methods. Key lines of evidence include:

- Biogenic heat signatures are evident within the LNAPL plume area.
- Methane and carbon dioxide production within the LNAPL area are significant.
- Dissolved phase hydrocarbon concentrations in shallow groundwater are stable to decreasing over time.
- Biogeochemical conditions are suitable for ongoing natural degradation of dissolved hydrocarbons (and potentially direct degradation of LNAPL within the saturated zone).
- Dominant biologically-mediated processes contributing to saturated zone mass losses are iron reduction, sulfate reduction, and methanogenesis with biodegradation rates for sulfate reduction and iron reduction likely constrained by the availability of electron acceptors. It is noted that aerobic respiration is also an important mechanism as oxygen (added to the groundwater via rainwater recharge) is also depleted.
- Bacterial data indicate the presence of requisite populations of hydrocarbon degraders consistent with the dominant natural attenuation process (including anaerobic and aerobic processes). High populations of eutrophic bacteria, which can degrade a broad spectrum of hydrocarbon compounds, reflect the dominance of aliphatic (chain structure) compounds in the LNAPL.
- Degradation of benzene and other hydrocarbon compounds has been demonstrated through mass losses from the baited biotraps and the ^{13}C enriched PLFA and DIC which clearly demonstrate bacteria are using benzene for energy and incorporating carbon into their cellular mass.

It is critical to note that outside of the LNAPL area the magnitudes of dissolved-phase concentrations of individual constituents are low and reflect the relatively small fraction of soluble constituents present within the LNAPL.

9.0 REFINED SITE UNDERSTANDING

Consistent with USEPA and ITRC guidance (USEPA, 2005 and ITRC, 2009b), this report utilized multiple lines of evidence leveraging both historical and recently-collected data to achieve the overall investigation objectives and answer the key data gap questions summarized below:

Overall Investigation Objectives

- Evaluate Site hydrogeologic controls on LNAPL distribution and occurrence.
- Quantify LNAPL saturation and potential mobility.
- Examine residual LNAPL as a source of current and future impacts to groundwater and soil gas.
- Assess LNAPL mass loss mechanisms.

Key Data Gaps Questions

Geology and Hydrogeology

- What is the spatial distribution of the fine-grained soil intervals relative to LNAPL sources?
- How do seasonal water table fluctuations contribute to mass losses and residualization (trapping of LNAPL within soil pores) of LNAPL?

Nature and Extent of LNAPL

- What were the natures of the historical releases?
- What are the physical and chemical properties of the LNAPL and how are LNAPL constituents partitioned between LNAPL, vapor, sorbed, and dissolved phases?
- How is LNAPL laterally and vertically distributed within the subsurface?

Mobility, Recoverability, and Residualization of LNAPL

- What is the LNAPL mobility and potential recoverability at the FMP area?

Natural Mass Losses of LNAPL and Dissolved-Phase Constituents

- Is there evidence of natural source zone depletion (NSZD) processes in the LNAPL-affected areas and/or natural attenuation in the associated dissolved phase groundwater plume, and what are the dominant processes?
- What are the implications of LNAPL presence on dissolved-phase plume longevity at this Site?

Overall, the results presented in this report support the initial understanding of the Site developed from the historical and RI data (**Section 2.5**). The investigation results also refine and better develop the initial concepts. The following discusses how the new data align with investigation objectives and demonstrate closure of the key data gaps.

Investigation activities found that fine-grained soil (silts and clays) are present as both laterally distinct zones and within pore spaces throughout the fine sand matrix within the historical range of groundwater fluctuations across the FMP area. These finer-grained soils have the potential for higher residual LNAPL saturations than coarser-grained soils because it is more difficult for the LNAPL to move out of the smaller pore throats in the finer-grained soils. Additionally, fluctuations of groundwater levels (up to four feet annually) have allowed redistribution of mobile LNAPL, thereby reducing saturation levels and LNAPL mobility. That is, while sufficient LNAPL heads may historically have been present to drive migration into fine-grained soils, and mobile and recoverable LNAPL was historically present, continued water level fluctuations and other mass loss mechanisms have effectively trapped LNAPL within or below these finer-grained soil horizons.

The LNAPL is comprised of predominantly mineral spirits with some aromatic and monocyclic aliphatic compounds (including volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], and associated tentatively identified compounds [TICs]) co-eluted within the LNAPL mixture. Field observations indicate that the LNAPL is heavily weathered in the Seep Area, and chemistry data show depletion of the aromatic fractions in the Former Tank Farm A area, potentially a result of weathering or preferential dissolution.

In general, the effective solubilities of LNAPL constituents are low, but based on dissolved-phase groundwater data from the LNAPL area, the LNAPL is a source of petroleum hydrocarbons (including benzene, ethylbenzene, toluene, and xylenes [BTEX], and TICs) in shallow groundwater. However, since the LNAPL is dominated by low solubility constituents, the magnitude of dissolved-phase concentrations of LNAPL constituents in groundwater is inherently limited.

Residual LNAPL impacts have been observed within shallow soils extending from the Former Resin Plant and Former Tank Farm A area to the Seep Area and Eastern Off-Property area. The lateral and vertical distribution of LNAPL reflects the release, migration, and subsequent residualization history. The lateral distribution of LNAPL impacts from the Former Tank Farm A area indicate that the historical release created a sufficient LNAPL head such that lateral migration (both cross-gradient and downgradient) and vertical migration below the water table (up to a depth of 24 feet bgs) occurred. The presence of residual LNAPL impacts in the Seep Area and Eastern Off-Property areas are primarily attributed to historical lateral LNAPL migration from the Former Tank Farm A area in the direction of groundwater flow. The presence of a groundwater divide in the vicinity of Former Tank Farm A and potentially the presence of fine-grained soils (see above) facilitated migration towards the Eastern Off-Property areas.

A key finding from the investigation is that the majority of LNAPL mass is located at or below the water table with the greatest vertical extent of LNAPL observed in the Former Tank Farm A area. LNAPL impacts within the Former Tank Farm A area extend from the unsaturated zone to up to 14 feet below the water table, in contrast to the residual LNAPL impacts in the downgradient areas where thicknesses range from approximately 2 to 5 feet and are within the range of groundwater elevation fluctuations. In some areas, prior estimates of the vertical distribution of LNAPL were greater than observed during the 2017 investigation. This is attributed, at least in part, to LNAPL depletion over the investigation history (extending back to the early 1990s).

Mobile LNAPL is absent on a Site-wide scale, but, as indicated by the presence of measurable LNAPL in a small number of wells within the Seep Area, Former Tank Farm A, and the Former Service Station/Tavern, there are some locations where mobile LNAPL is present. The observation of measurable LNAPL in the wells occurs predominantly during periods of low water table conditions, a result of local LNAPL drainage from the soil pores.

The extent of recoverable LNAPL is more limited and is confined to the Seep Area with recovery volumes dominated by LNAPL removed from one well (H-3P). In all other areas, the monitoring data and petrophysical testing has demonstrated that the LNAPL saturations are well below the literature values for residual saturation limits (the saturation level at which LNAPL is recoverable) in fine-grained sands (up to 24 percent pore volume). The saturation levels measured by petrophysical testing of soil cores are almost an order of magnitude lower than literature values (on average 3 percent) and reflect the age of the plume and robust natural source zone depletion processes. The low saturations are further supported by EPH concentrations below calculated and literature values for residual mobility thresholds. The low LNAPL saturations (and associated low transmissivity and potential recoverability) in combination with the seasonal variability in groundwater levels and soil heterogeneity are key impediments to LNAPL recovery.

There are multiple lines of evidence indicating that natural degradation of LNAPL mass and dissolved hydrocarbons is occurring in the vadose and saturated zones. The key mechanisms of mass losses include volatilization and subsequent degradation within the vadose zone, dissolution into groundwater and biodegradation in the dissolved-phase, and potentially direct degradation of LNAPL through cleavage of aliphatic compounds and subsequent degradation of lower carbon chain by-products.

Key lines of evidence supporting natural mass losses of the LNAPL and natural attenuation of the dissolved-phase constituents include:

- Biogenic heat signatures within the LNAPL plume area.
- Biogenic production of methane and carbon dioxide (and depletion of oxygen) within and downgradient of the LNAPL area.
- Stable dissolved phase hydrocarbon concentrations in shallow groundwater proximal to the LNAPL plume area.
- Suitable biogeochemical conditions for ongoing natural degradation of dissolved hydrocarbons (and potentially direct degradation of LNAPL within the saturated zone) with biodegradation rates for sulfate reduction and iron reduction likely constrained by the availability of electron acceptors.
- A range of biologically-mediated processes contributing to saturated zone mass losses including anaerobic mechanisms (iron reduction, sulfate reduction, and methanogenesis) and aerobic respiration.
- Requisite populations of a variety of hydrocarbon degrading bacteria consistent with the range of natural attenuation mechanisms (including anaerobic and aerobic processes).

Literature values for NSZD processes at other LNAPL sites range from 134 to 14,000 gallons/acre/year, significantly exceeding LNAPL mass removal rates via active recovery efforts (81 gallons of LNAPL was recovered from wells in the Former Tank Farm A and Seep Area in 2017).

10.0 CONCLUSIONS

Based on the supplemental evaluations presented in this Report, the investigation objectives have been achieved and the key data gap questions have been answered. Overall, the following key conclusions can be made:

- Site operations ceased approximately 40 years ago and thus the primary sources of potential additional releases to the subsurface were removed (e.g., tank farms, manufacturing and storage areas).
- The LNAPL extends laterally from the Former Resin Plant and Former Tank Farm A area to the Eastern Off-Property area and the Seep Area.
- The LNAPL extends vertically as deep as 24 feet bgs in the former Resin Plant/Tank Farm A area, 15 to 16 feet bgs in the eastern Off-Property area, and approximately 5 to 7 feet bgs in the Seep Area.
- The extent of the LNAPL is a result of historical conditions when LNAPL saturations and heads were sufficient to facilitate LNAPL migration from Former Tank Farm A towards the Seep Area and Eastern Off-Property Areas. **Natural source zone depletion processes and residualization (associated with water table fluctuations) have reduced LNAPL saturations such that the LNAPL saturations through the majority of the LNAPL-effected area are below residual saturation levels.**
- **The LNAPL plume is stable with redistribution occurring only within the existing LNAPL plume footprint.** In general, the LNAPL is neither mobile nor recoverable. The LNAPL is trapped in the soil pores of the formation predominantly at or below the water table. Finer-grained soils (silts and clays) present as both laterally distinct zones and within pore spaces throughout the fine sand matrix are key controls on the mobility and recoverability of LNAPL, enabling higher residual LNAPL saturations than coarser-grained soils. Fine-grained soils combined with water table fluctuations and several years of recovery activities in the Seep Area have residualized and/or removed the majority of the mobile LNAPL. Recovered LNAPL volumes have been substantially reduced, with only 81 gallons of LNAPL recovered thoughout all of 2017.
- The LNAPL is a source of petroleum hydrocarbons (VOCs, SVOCs, and associated tentatively identified compounds [TICs]) in shallow groundwater within and immediately adjacent to the LNAPL. **However, since the LNAPL is dominated by low solubility constituents, the dissolved-phase concentrations of LNAPL constituents in groundwater is inherently limited.**
- **There are multiple lines of strong evidence that natural degradation of LNAPL mass and dissolved hydrocarbons is occurring in the vadose zone and saturated zone.** The key mechanisms of mass losses include volatilization and subsequent degradation within the vadose zone, dissolution into groundwater and biodegradation in the dissolved-phase, and potentially direct degradation of LNAPL through cleavage of aliphatic compounds and subsequent degradation of lower carbon chain by-products.

This report has achieved the goal of refining the understanding of LNAPL at the Site. On this basis, the LNAPL investigation phase of the project is considered complete with sufficient data to support discussions regarding remedial decision-making.

11.0 REFERENCES

American Petroleum Institute. (2006). API Interactive LNAPL Guide Version 2.0.4. API.org

American Petroleum Institute. (2013). API LNAPL Tool Kit. Advanced Education and Analysis Tools. API.org

Beckett, G.D., and D. Huntley. (2000). Soil properties and design factors influencing free-phase hydrocarbon recovery: Environmental Science and Technology, v. 32, n. 2, p. 287-293.

Beckett, G.D. and P. Lundegard. (1997). Practically impractical – The limits of LNAPL recovery and relationship to risk, In: Proceedings of the Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Remediation Conference, Houston, TX, November 12-14, pp. 442-445K, Ground Water Publishing Company.

Brost et al. (2000). Non-Aqueous Phase Liquid (NAPL) Mobility Limits in Soil; API Bulletin No. 9.

Chatzis I et al. (1993). The effect of production rate on the recovery of waterflood residual oil under gravity assisted inert gas injection. In: Proceedings of 5th petroleum conference of the South Saskatchewan Section, 18–19 Oct, The Petroleum Society of CIM, Regina, Saskatchewan (Paper no. 32).

Eichert, J., McAlexander, B., Lyverse, M., Michalski, P., and Sihota, N. (2017). *Spatial and Temporal Variation in Natural Source Zone Depletion Rates at a Former Oil Refinery*. Vadose Zone Journal, 16(1), 2017.

EHS Support, LLC (EHS Support). (2017). LNAPL Investigation Work Plan, Former Manufacturing Plant Facility, Gibbsboro, New Jersey. July.

Garg, S., Newell, C.J., Kularni, P.R., King, D.C., Adamson, D.T., Renno, M.I., and Sale, T. (2017). *Overview of Natural Source Zone Depletion: Processes, Controlling Factors, and Composition Change*. Groundwater Monitoring & Remediation 37(3), 2017.

Higginbotham, J., M. A. Parcher, J. A. Johnson. (2003). The Importance of Understanding Inherent LNAPL Mobility in Characterizing and Remediating Sites. Proc. Conference on Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention, Detection, and Remediation, Costa Mesa, CA API/NGWA.

Irwin, R.J, VanMouwerik, M., Stevens, L., Seese, M.D., and Basham, W. (1997). Environmental Contaminants Encyclopedia, National Park Service, Water Resources Division, Fort Collins, CO.

ITRC (Interstate Technology & Regulatory Council). (2009a). *Evaluating Natural Source Zone Depletion at Sites with LNAPL*. LNAPL-1. Washington, D.C.: Interstate Technology & Regulatory Council, LNAPLs Team.

ITRC (Interstate Technology & Regulatory Council). (2009b). *Evaluating LNAPL Remedial Technologies for Achieving Project Goals*. LNAPL-2. Washington, DC: Interstate Technology & Regulatory Council, LNAPLs Team.

Johnson, P., Paul Lundegard, P., and Liu, Z. (2006). *Source Zone Natural Attenuation at Petroleum Hydrocarbon Spill Sites—I: Site-Specific Assessment Approach*. Ground Water Monitoring & Remediation, 26(4), 2006.

Kummel, H.B., Lewis, J.V. (1915). Bulletin 14, The Geology of New Jersey, Geologic Survey of New Jersey.

Lari, K.S., Rayner, J.L, and Davis, G.B. (2017). A Computational Assessment of Representative Sampling of Soil Gas Using Existing Groundwater Monitoring Wells Screened Across the Water Table. Journal of Hazardous Materials, 335, 2017.

Los Angeles LNAPL Workgroup (2015). Final report for the LA Basin LNAPL Recoverability Study. Western States Petroleum Association.

Lundegard, P.D. and Johnson, P.C (2006). *Source Zone Natural Attenuation at Petroleum Hydrocarbon Spill Sites—II: Application to a Former Oil Field*. Ground Water Monitoring & Remediation 26(4), 2006.

Lunne, Robertson, and Powell. (1997). Cone Penetration Testing in Geotechnical Practice. Blackie Academic & Professional, London, 312 p.

MADEP. (2002). Characterizing Risks Posed By Petroleum Contaminated Sites: Implementation of the MAP VPH/EPH Approach. Poliocy #WSC 02-411.

McCoy, K., Zimpron, J., Sale, T., and Lyverse, M. (2015). Measurement of Natural losses of LNAPL Using CO2 Traps. Groundwater, 2015.

Melrose, J.C., Brandner, C.F. (1974). Role of capillary forces in determining microscopic displacement efficiency for oil recovery by waterflooding. J. Can. Pet. Tech. 13, 54–62.

Naval Facilities Engineering Command (NAVFAC). (2017). New Developments in LNAPL Site Management, April 2017.

Newell, C., Sale, T., Connor, J., Kulkarni, P, and Piontek, K. 2016. *Advances in Monitoring Petroleum-Contaminated Sites*. Presentation to Federal Remediation Technologies Roundtable (FRTR), November 2, 2016.

NJDEP, 2010. Protocol for Addressing Extractable Petroleum Hydrocarbons. Version 5.0. August 9, 2010.

NJDEP. (2012). Light Non-aqueous Phase Liquid (LNAPL) Initial Recovery and Interim Remedial Measures Technical Guidance, Version 1.2, June 29, 2012.

NJDEP (2014). Data of Known Quality Protocols. Technical Guidance Version 1.0. April 2014.

NOAA. (1999). Database of Hazardous Materials, Chemical Hazardous Response Information Systems Code MNS, Mineral Spirits, accessed on August 14, 2014 from: http://cameochemicals.noaa.gov/chris/MNS.pdf

Owens, J.P., Sugarman, P.J., Sohl, N.F., Parker, R.A., Houghton, H.F., Volkert, R.A., Drake, A.A., Jr., and Orndorff, R.C. (1998). Bedrock Geologic Map of Central and Southern New Jersey, U.S. Geological Survey Miscellaneous Investigation Series Map I-2540-B, 4 sheets.

Palaia , T. (2016) . Natural Source Zone Depletion Rate Assessment. Applied NAPL Science Review 6, 2016; http://www.icontact-archive.com/IXYNsGudxSsIUD6HuogSpRCtv5aRUE2v?w=3

Piontek , K. , Leik , J. , Wooburne , K. , and MacDonald , S. , 2014 . Insights into NSZD rate measurements at LNAPL sites. 16th Railroad Environment Conference, University of Illinois, Urbana – Champaign, Kieth Piontek, TRC, St. Louis, Missouri.

Remediation Technologies Development Forum (RTDF). (2005). “The Basics”: Understanding the Basics of Light Non-Aqueous Phase Liquids [Lapels] in the Subsurface. February.

Sherwin-Williams. (2012). Revised Work Plan for Additional Groundwater Characterization.

Sherwin-Williams. (2016). Technical Memorandum for Additional Delineation of Petroleum-Related Constituents at Select United States Avenue Residential Properties. Sherwin-Williams/Hilliards Creek Site in Gibbsboro, New Jersey, Administrative Order Index No. II CERCLA-02-99-2035. November 1.

Sherwin-Williams. (2017a). Revised Technical Memorandum for Newly Proposed Wells to Complete Groundwater Characterization Activities. Former Manufacturing Plant – Groundwater Operable Unit, Sherwin-Williams/Hilliards Creek Site, Gibbsboro, New Jersey, Administrative Order Index No. II CERCLA-02-99-2035. April 12.

Sherwin-Williams. (2017b). Revised LNAPL Investigation Work Plan and Response to Comments, Sherwin-Williams/Hilliards Creek Site, Gibbsboro, New Jersey. Administrative Order Index No. II CERCLA-02-99-2035. July 12.

Sherwin-Williams. (2018). Technical Memorandum Summarizing the Results of Groundwater Sampling at 16 Newly Installed Wells and Proposal for Additional Monitoring Well Installation and Sampling, Former Manufacturing Plant-Groundwater Operable Unit, Sherwin-Williams / Hilliards Creen Site, Gibbsboro, New Jersey, Administrative Order Index No. II CERCLA-02-99-2035. January 5.

Sihota , N.J. , O. Singurindy , and K.U. Mayer . (2011). CO2-efflux measurements for evaluating source zone natural attenuation rates in a petroleum hydrocarbon contaminated aquifer . Environmental Science & Technology 45 : 482 – 488 .

Stockwell, E.B. 2015 Thesis: Continuous NAPL Loss Rates Using Subsurface Temperatures, Colorado State University, 2015.

Suthersan, S., B. Koons , and M. Schnobrich. (2015). *Contemporary Management of Sites with Petroleum LNAPL Presence*. Groundwater Monitoring & Remediation 35, 2015.

Sweeney, R.E. and Ririe, G.T. (2014). Temperature as a Tool to Evaluate Aerobic Biodegradation in Hydrocarbon Contaminated Soil. Groundwater Monitoring & Remediation 34(3), 2014.

United State Environmental Protection Agency (USEPA) (1996). *How To Effectively Recover Free Product At Leaking Underground Storage Tank Sites: A Guide For State Regulators, Chapter III – Behavior of Hydrocarbons in the Subsurface (EPA 510-R-96-001).* September, 1996.

USEPA (1999) Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites (OSWER Directive Number 9200.4-17P; EPA-540-R-99-009) dated April 21, 1999.

USEPA (2002) Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies, EPA/540/S-02/500, 2002; http://nepis.epa.gov/Exe/ZyPDF.cgi/10004674.PDF?Dockey=10004674.PDF

USEPA. (2005). *A Decision-Making Framework for Cleanup of Sites Impacted with Light Non-Aqueous Phase Liquids (LNAPL) (EPA 542-R-04-011)*. March, 2005.

United States Environmental Protection Agency, Region 2 (EPA). 2017. Review of the Febuary 2017 – LNAPL Investigaiton Work Plan, Former Manufacturing Plant Area, Sherwin-Williams/Hilliards Creek Superfund Site, Administrative Order Index No. II CERCLA-02-99-2035. June 6.

Warren, E., and Bekins, B.A. (2015). *Relating Subsurface Temperature Changes to Microbial Activity at a Crude Oil-Contaminated Site*. Journal of Contaminant Hydrology, 182, 2015.

Weston. (2004). Comprehensive Remedial Investigation Report, The Paint Works Corporate Center, Gibbsboro, New Jersey, dated December 1, 2004.

Weston. (2009). Sampling and Analysis Plan and Quality Assurance Project Plan, Revised Supplemental Remedial Investigation Work Plan for the Sherwin-Williams/Hilliards Creek Site, Former Manufacturing Plant, Gibbsboro, New Jersey. February 2009.

Weston. (2011). Evaluation of Soil, Sediment, Surface Water and Groundwater Results and Proposal for Additional Site Characterization. Former Manufacturing Plant. Sherwin-Williams/Hilliards Creek Site. March 1, 2011.

Weston. (2014). Former Manufacturing Plant - Groundwater Technical Memorandum, Former Manufacturing Plant Area, Sherwin-Williams/Hillards Creek Site, Administrative Order Index No. II CERCLA-02-99-2035, submitted December 2014.

Weston. (2016a). Health and Safey Plan, The Sherwin-Williams Company, Operable Unit 1 Residential Remedial Design/Removal Action, Gibbsboro, NJ. May 19.

Weston. (2016b). Remedial Investigation Report, Soil, Sediment, Surface Water and Pore Water, Former Manufacturing Plant, Gibbsboro, Camden County, New Jersey, Administrative Order Index No. II CERCLA-02-99-2035. September 2016.

Weston. (2018). Remedial Investigation Report, Soil, Sediment, Surface Water, Pore Water and Vapor Intrusion, Sherwin-Williams/Hilliards Creek Superfund Site, Former Manufacturing Plant Area, Gibbsboro, Camden County, New Jersey, Administrative Order Index No. II CERCLA-02-99-2035. Febuary 14, 2018.

TABLES

Table 4-1
CPT/MIP Boring Summary
The Sherwin-Williams Company
Gibbsboro, New Jersey

Type	Boring ID	Co-Located Soil Core Boring Location (if applicable)	Area	Date Advanced	Final Depth Advanced (ft bgs)	Easting[(1)]	Northing[(1)]
CPT/MIP	CPT/MIP-01	NA	Area D	9/19/2017	30	362324.01	366098.96
CPT/MIP	CPT/MIP-02	NA	Area D	9/19/2017	28.7	362375.17	366000.33
CPT/MIP	CPT/MIP-03	NA	Area D	9/19/2017	33.6	362318.31	365965.24
CPT/MIP	CPT/MIP-04	DP-08	Area D	9/20/2017	32.3	362311.41	366021.55
CPT/MIP	CPT/MIP-05	NA	Area I	9/20/2017	20.6	361903.94	366088.40
CPT/MIP	CPT/MIP-06	NA	Area I	9/20/2017	17.5	361951.93	366044.49
CPT/MIP	CPT/MIP-07	DP-10	Area I	9/20/2017	34.4	361881.33	365949.52
CPT/MIP	CPT/MIP-08	DP-09	Area D	9/20/2017	36.6	362284.17	366012.35
CPT/MIP	CPT/MIP-09	NA	Area C	9/21/2017	13.8	361877.02	365774.85
CPT/MIP	CPT/MIP-10	NA	Area C	9/21/2017	15.4	361941.23	365806.68
CPT/MIP	CPT/MIP-11	DP-11	Area C	9/21/2017	21.7	362029.64	365827.14
CPT/MIP	CPT/MIP-12	NA	Area F	9/21/2017	42.8	361764.99	365278.20
CPT/MIP	CPT/MIP-13	NA	Area F	9/21/2017	42.5	361724.16	365322.37
CPT/MIP	CPT/MIP-14	NA	Area K	9/22/2017	43.4	361809.87	365604.36
CPT/MIP	CPT/MIP-15	DP-16	Area K	9/22/2017	45.6	361741.19	365583.42
CPT/MIP	CPT/MIP-16	DP-13	Area K	9/22/2017	46.9	361862.66	365575.27
CPT/MIP	CPT/MIP-17	DP-12	Area G	9/22/2017	27.6	362156.14	365572.93
CPT/MIP	CPT/MIP-18	DP-15	Area B	9/25/2017	20.9	362265.04	365883.28
CPT/MIP	CPT/MIP-19	DP-17	Area E	9/25/2017	42.8	361871.98	365512.60
CPT/MIP	CPT/MIP-20	DP-14	Area E	9/25/2017	45.4	361893.66	365539.63
CPT/MIP	CPT/MIP-21	DP-18	Area E	9/25/2017	45.2	361914.37	365401.72
CPT/MIP	CPT/MIP-22	NA	Area E	9/26/2017	42.7	362059.68	365490.55
CPT/MIP	CPT/MIP-23	NA	Area E	9/26/2017	54.5	361925.80	365487.41
CPT/MIP	CPT/MIP-24	DP-19	Area F	9/26/2017	47.7	361850.66	365382.96
CPT/MIP	CPT/MIP-25	DP-20	Area F	9/26/2017	42.6	361840.24	365283.19
CPT/MIP	CPT/MIP-26	DP-21	Area A	9/27/2017	63	362190.51	365714.96
CPT/MIP	CPT/MIP-27	DP-22	Area A	9/27/2017	66.1	362295.78	365796.65
CPT/MIP	CPT/MIP-28	NA	Area A	9/27/2017	64.4	362238.74	365743.78

Table 4-1
CPT/MIP Boring Summary
The Sherwin-Williams Company
Gibbsboro, New Jersey

Type	Boring ID	Co-Located Soil Core Boring Location (if applicable)	Area	Date Advanced	Final Depth Advanced (ft bgs)	Easting(1)	Northing(1)
CPT/MIP	CPT/MIP-29	NA	Area A	9/28/2017	69.5	362300.63	365696.65
CPT/MIP	CPT/MIP-30	N/A	Area A	9/28/2017	66.5	362141.52	365791.74
CPT/MIP	CPT/MIP-31	DP-24	Area J	NA	NA	NA	NA
CPT/MIP	CPT/MIP-32	DP-23	Area J	9/29/2017	25	362234.66	365518.75
CPT/MIP	CPT/MIP-33	NA	Area J	9/29/2017	27.3	362169.38	365429.22
CPT/MIP	CPT/MIP-34	NA	Area J	9/29/2017	28.4	362266.84	365443.46
CPT/MIP	CPT/MIP-35	NA	Area J	9/29/2017	27.4	362175.55	365498.72
CPT/MIP	CPT/MIP-36	NA	Area J	9/29/2017	25	362227.10	365420.76

Notes:

NA = Not Applicable

ft bgs = feet below ground surface

(1) Horizontal Datum: New Jersey State Plan Coordinate NAD83, Vertical Datum: NAVD 88.

Table 4-2
Soil Core Summary
The Sherwin-Williams Company
Gibbsboro, New Jersey

Type	Boring ID	Co-Located CPT/MIP Location (if applicable)	Area	Date Advanced	Final Depth Advanced (ft bgs)	Easting(1)	Northing(1)
Soil core	DP-01	N/A	Area H	7/12/17	45	362293.39	365612.32
Soil core	DP-02	N/A	Area H	7/12/17	25	362132.72	365470.51
Soil core	DP-03	N/A	Area H	7/12/17	40	362088.94	365437.80
Soil core	DP-04	N/A	Area H	7/12/17	40	362139.73	365387.21
Soil core	DP-05	N/A	Area H	7/12/17	45	361903.94	366088.40
Soil core	DP-06	N/A	Area H	7/13/17	40	361961.71	365326.32
Soil core	DP-07	N/A	Area H	7/13/17	40	361896.80	365223.23
Soil Core	DP-08	CPT/MIP-04	Area D	9/25/17	20	362314.76	366022.05
Soil core	DP-09	CPT/MIP-08	Area D	9/25/17	20	362284.19	366012.34
Soil core	DP-10	CPT/MIP-07	Area I	9/25/17	10	361881.32	365945.78
Soil core	DP-11	CPT/MIP-11	Area C	9/25/17	20	362029.45	365828.60
Soil core	DP-12	CPT/MIP-17	Area G	9/25/17	20	362154.49	365572.90
Soil core	DP-13	CPT/MIP-16	Area K	9/26/17	45	361883.25	365608.61
Soil core	DP-14	CPT/MIP-20	Area K	9/26/17	45	361932.25	365549.35
Soil core	DP-15	CPT/MIP-18	Area B	9/26/17	25	362263.01	365883.08
Soil core	DP-16	CPT/MIP-15	Area K	9/27/17	40	361717.70	365599.23
Soil core	DP-17	CPT/MIP-19	Area E	9/27/17	40	361871.98	365512.61
Soil core	DP-18	CPT/MIP-21	Area E	9/27/17	45	361915.12	365403.30
Soil core	DP-19	CPT/MIP-24	Area F	9/28/17	40	361848.77	365386.09
Soil core	DP-20	CPT/MIP-25	Area F	9/28/17	40	361841.64	365284.86
Soil core	DP-21	CPT/MIP-26	Area A	9/28/17	40	362192.28	365716.06
Soil core	DP-22	CPT/MIP-27	Area A	9/29/17	30	362295.87	365798.30
Soil core	DP-23	CPT/MIP-32	Area J	9/29/17	25	362234.66	365518.75
Soil core	DP-24	CPT/MIP-31	Area J	9/29/17	25	362279.60	365488.20
Boring	FOC-01	NA	Background	9/25/17	20	362711.90	366274.71
Boring	FOC-02	NA	Background	9/25/17	20	362777.46	366350.13

Notes:
NA = Not Applicable
No property access to complete boring survey at DP-05 location, a hand-held global positioning system (GPS) unit was used to survey location.
ft bgs = feet below ground surface
(1) Horizontal Datum: New Jersey State Plan Coordinate NAD83, Vertical Datum: NAVD 88.

EHS Support consider it done

Table 4-3
Soil Core Intervals Submitted for PTS Laboratory Analysis
The Sherwin-Williams Company
Gibbsboro, New Jersey

Soil Core Boring ID	Soil Core Intervals Submitted to PTS Laboratories (ft bgs)	Soil Core Interval Selected for Grain Size Analysis (ASTM D446) (ft bgs)	Initial Testing Program	Advanced Mobility Testing Program	
			Soil Core Interval Selected for Pore Fluid Saturation Analysis Package (ft bgs)	Soil Core Interval Selected for Air/Water Displacing Oil Inhibition Tests, Capillary Pressure (ft bgs)	Soil Core Interval Selected for Effective Drainage Porosity (ASTM D425) (ft bgs)
DP-1	15.3-16	15.3-16	15.3-16	NA	NA
DP-2	12-12.6	12-12.6	12-12.6	NA	NA
DP-4	13.5-14.2	13.5-14.2	NA	13.5-14.2	13.5-14.2
DP-5	11.5-12.2	11.5-12.2	11.5-12.2	NA	NA
DP-8	12-12.7	12-12.7	12-12.7	NA	NA
DP-9	8-8.8	8-8.8	NA	8-8.8	8-8.8
DP-13	2.2-3, 6.5-7.2	2.2-3	NA	2.2-3	2.2-3
		6.5-7.2	6.5-7.2	NA	NA
DP-14	6.8-7.5, 13.5-14.2	6.8-7.5	NA	6.8-7.5	6.8-7.5
		13.5-14.2	13.5-14.2	NA	NA
DP-15	6.8-7.4, 11-11.7	6.8-7.4	NA	6.8-7.4	6.8-7.4
		11-11.7	11-11.7	NA	NA
DP-16	3.3-4	3.3-4	3.3-4	NA	NA
DP-17	1.9-2.5, 3-3.6, 4.4-5	1.9-2.5	1.9-2.5	NA	NA
		3-3.6	NA	3-3.6	3-3.6
		4.4-5	4.4-5	NA	NA
DP-18	3.5-4.2, 6.5-7.2	3.5-4.2	NA	3.5-4.2	3.5-4.2
		6.5-7.2	6.5-7.2	NA	NA
DP-20	6.2-6.8, 8-8.8	6.2-6.8	NA	6.2-6.8	6.2-6.8
		8-8.8	8-8.8	NA	NA
DP-21	10.7-11.2, 11.2-11.7, 14-14.6, 16.9-17.3	10.7-11.2	10.7-11.2	NA	NA
		11.2-11.7	NA	11.2-11.7	11.2-11.7
		14-14.6	14-14.6	NA	NA
		16.9-17.3	16.9-17.3	NA	NA
DP-22	7.3-8, 11.3-12, 13.5-14.2, 17.7-18.3	7.3-8	7.3-8	NA	NA
		11.3-12	11.3-12	NA	NA
		13.5-14.2	NA	13.5-14.2	13.5-14.2
		17.7-18.3	17.7-18.3	NA	NA
		20.5-21	20.5-21	NA	NA
DP-23	11-11.7, 14-14.7, 16-16.7	11-11.7	11-11.7	NA	NA
		14-14.7	NA	14-14.7	14-14.7
		16-16.7	16-16.7	NA	NA
DP-24	13.5-14.2, 17-17.5	13.5-14.2	NA	13.5-14.2	13.5-14.2
		17-17.5	17-17.5	NA	NA

Notes:
NA = not analyzed
ft bgs = feet below ground surface
ASTM = American Society for Testing and Materials

EHS Support consider it done

Table 4-4
Soil Sample Intervals Submitted for TestAmerica Laboratory Analysis
The Sherwin-Williams Company
Gibbsboro, New Jersey

Soil Core Boring ID	Soil Samples Submitted to Test America Laboratories (ft bgs)	USEPA CLP Method SOM02.3 - Trace & Low/Medium VOCs	USEPA CLP Method SOM02.1 - SVOCs	MADEP - VPH	NJDEP - EPH
DP-01	14.7-15.2	X	X	X	X
	16-16.5	X	X	X	X
	18.7-19.2	X	X	X	X
DP-02	12.6-13.1	X	X	X	X
	14.6-15.1	X	X	X	X
	17.6-18.1	X	X	X	X
DP-04	14.2-14.7	X	X	X	X
	16.6-17.1	X	X	X	X
	19.2-19.7	X	X	X	X
DP-05	11-11.5	X	X	X	X
	12.2-12.7	X	X	X	X
	16-16.5	X	X	X	X
DP-08	6.5-7	X	X	X	X
	9.5-10	X	X	X	X
	11.5-12	X	X	X	X
	18.8-19.3	X	X	X	X
DP-09	7.5-8	X	X	X	X
DP-10	3.8-4.3	X	X	X	X
	6.5-7	X	X	X	X
DP-11	2.7-3.2	X	X	X	X
	4.6-5.1	X	X	X	X
	10-10.5	X	X	X	X
	13.4-13.9	X	X	X	X
DP-12	13-13.5	X	X	X	X
	15-15.5	X	X	X	X
	19.5-20	X	X	X	X
DP-13	3-3.5	X	X	X	X
	6-6.5	X	X	X	X
	9.6-10.1	X	X	X	X
	13-13.5	X	X	X	X
	38.5-39	X	X	X	X
DP-14	6-6.5	X	X	X	X
	13-13.5	X	X	X	X
DP-15	4.3-4.8	X	X	X	X
	7.5-8	X	X	X	X
	10.5-11	X	X	X	X
DP-16	4-4.5	X	X	X	X
DP-17	1.4-1.9	X	X	X	X
	2.5-3	X	X	X	X
	4-4.5	X	X	X	X
DP-18	3-3.5	X	X	X	X
	4.2-4.7	X	X	X	X
	7.5-8	X	X	X	X
	11.5-12	X	X	X	X
DP-20	5-5.5	X	X	X	X
	6.8-7.3	X	X	X	X
	8.3-8.8	X	X	X	X
	12.5-13	X	X	X	X
DP-21	10.3-10.7	X	X	X	X
	11.7-12.2	X	X	X	X
	14.6-15.1	X	X	X	X
DP-22	7-7.5	X	X	X	X
	11-11.5	X	X	X	X
	13-13.5	X	X	X	X
	17-17.5	X	X	X	X
DP-23	11.7-12.2	X	X	X	X
	14.7-15.2	X	X	X	X
	16.7-17.2	X	X	X	X
	19.7-20.2	X	X	X	X
DP-24	11.7-12.2	X	X	X	X
	14.2-14.7	X	X	X	X
	18-18.5	X	X	X	X

Notes:
ft bgs = feet below ground surface
"X" = denotes sample selected for referenced laboratory method analysis.
USEPA CLP = United States Environmental Protection Agency - Corporate Laboratory Program.
VOCs = volatile organic compounds [including tentively identified compounds (TICs)].
SVOCs = semi-volatile organic compounds (including TICs).
MADEP VPH = Massachusetts Department of Environmental Protection - Volatile Petroleum Hydrocarbons.
NJDEP EPH = New Jersey Department of Environmental Protection - Extractable Petroleum Hydrocarbons.

Table 4-6
Groundwater Monitoring Well Sampling Program and Rationale
The Sherwin-Williams Company
Gibbsboro, New Jersey

Water-bearing Zone	Well	Field Parameters(1)	MNA Parameters(2)	Quant Array-Petroleum Suite Bio-Traps(3)	SIP-Traps (Benzene "Baited" Bio-Traps)(4)
Shallow	MW-SCAR	x	x	x	
Shallow / Intermediate	MW-28	x	x		
Shallow	MW-11	x	x	x	x
Shallow	MW-12	x	x	x	x
Intermediate	MPMW0003	x	x	x	
Shallow / Intermediate	MW-1	x	x		
Shallow	MW-3	x	x	x	
Shallow	MW-13R	x	x	x	x
Shallow	MW-26	x	x	x	x
Shallow	MPMW0009	x	x	x	x
Shallow	MW-4	x	x		
Shallow	MW-6	x	x		
Shallow	MPMW0008	x	x		
Deep	MW-34	x	x	x	
Deep	MW-30	x	x	x	
Deep	MW-35	x	x	x	
Deep	MW-36	x	x		
Deep	MW-41	x	x	x	
Deep	MPMW0026	x	x	x	

Notes:

MNA = monitor natural attenuation

(1) Includes monitoring for temperature, pH, conductivity, dissolved oxygen, redox potential, and turbidity.

(2) Includes laboratory analysis for dissolved organic carbon, methane, carbon dioxide, sulfate/sulfide, nitrate/nitrite, dissolved/total iron, manganese, alkalinity, and volatile fatty acids.

(3) Includes laboratory analysis for the Quant Array-Petroleum Suite Bio-Traps.

(4) Will include laboratory analysis of the ^{13}C-labeled benzene 'baited' Bio-Traps by stable isotope probing (SIP) techniques (scheduled for April 2018) .

Shallow = upper water-bearing zone

Intermediate = middle water-bearing zone

Deep = deep water-bearing zone

Table 5-1
Natural Gamma Log Evaluation
The Sherwin-Williams Company
Gibbsboro, New Jersey

Well Location	Approximate Ground Surface Elevation (ft msl)	Interpreted Fine Grained Soil Interval[1]				Vicinity Shallow Zone Well	GW Elevation Range (2010-2017) (ft msl)	
		Top (ft bgs)	Bottom (ft bgs)	Top (ft msl)	Bottom (ft msl)		Low	High
MW-30	97.91	2	2.5	95.91	95.41	MW-12	86.94	89.15
	97.91	7	8	90.91	89.91		86.94	89.15
	97.91	12	13	85.91	84.91		86.94	89.15
	97.91	16	23	81.91	74.91		86.94	89.15
MW-31	90.35	7	10	83.35	80.35	MW-15	85.32	87.04
MW-32	102.13	2	3	100.13	99.13	MW-27	85.24	94.63
	102.13	9	10	93.13	92.13		85.24	94.63
	102.13	14	18	88.13	84.13		85.24	94.63
MW-33	90.42	10	10.5	80.42	79.92	MW-13R	84.23	85.77
	90.42	16	18	74.42	72.42		84.23	85.77
MW-41	89.83	3	4	86.83	85.83	MW-23	77.53	80.97
	89.83	8	10	81.83	79.83		77.53	80.97
MPMW006	97.10	14.5	20	82.60	77.10	MW-12	86.94	89.15
	97.10	20	25	77.10	72.10		86.94	89.15
MPMW0013	87.30	10	13	77.30	74.30	MPMW0011	81.91	84.11

Notes:

ft msl = feet above mean sea level

ft bgs = feet below ground surface

(1) Fine grained soil interval interpreted form 2012 and 2013 natural gamma logs (Weston, 2014).

[green] = Location with groundwater intercepting fine grained unit.

[blue] = Location with groundwater above or below fine grained unit (<5').

Table 5-2
Electric Conductivity Log Evaluation
The Sherwin-Williams Company
Gibbsboro, New Jersey

Soil Boring Location	Approximate Ground Surface Elevation (ft msl)	Interpreted Fine Grained Soil Interval[1]				Vicinity Shallow Zone Well	GW Elevation Range (2010-2017) (ft msl)	
		Top (ft bgs)	Bottom (ft bgs)	Top (ft msl)	Bottom (ft msl)		Low	High
MIP-03	88.3	2	11	86.30	77.30	MW-13R	82.99	84.23
MIP-04	90.0	8	20	82.00	70.00	MW-15	85.32	87.04
MIP-05	85.3	2	5	83.30	80.30	MW-14	82.44	83.30
MIP-06	85.3	2	4	83.30	81.30	MW-14	82.44	83.30
MIP-07	98.0	11	13	87.00	85.00	MW-12	86.94	89.15
MIP-08	103.0	2	3	101.00	100.00	MW-24	86.96	91.82
MPSB0159	103.0	3	3.5	100.00	99.50	MPMW0005	89.86	92.58
MPSB0160	103.0	5	12	98.00	91.00	MW-24	86.96	91.82
MPSB0161	98.0	2	4	96.00	94.00	MW-12	86.94	89.15
	98.0	11	12	87.00	86.00		86.94	89.15
MPSB0162	98.0	7	9	91.00	89.00	MW-12	86.94	89.15
MPSB0163	98.0	12	18	86.00	80.00	MW-12	86.94	89.15
MPSB0164	88.0	3	4	85.00	84.00	MPMW0001	82.42	83.33
MPSB0165	86.0	5	13	81.00	73.00	MPMW0009	83.96	85.36
MPSB0166	87.0	2	4	85.00	83.00	MPMW0011	81.91	84.11
MPSB0167	86.0	3	10	83.00	76.00	MPMW0009	83.96	85.36
MPSB0171	107.0	2	2.5	105.00	104.50	MW-25	88.58	92.04
MPSB0174	88.3	17	25	71.30	63.30	MW-13R	82.99	84.23
MPSB0175	90.6	2	3	88.60	87.60	MW-16	85.37	86.88
MPSB0176	90.0	8	10	82.00	80.00	MW-15	85.32	87.04
MPSB0177	103.0	1	4	102.00	99.00	MW-24	86.96	91.82
MPSB0178	90.0	2	4	88.00	86.00	MW-15	85.32	87.04
	90.0	6	10	84.00	80.00		85.32	87.04
MPSB0178A	98.0	2	4	96.00	94.00	MW-12	86.94	89.15

Notes:

ft msl = feet above mean sea level.

ft bgs = feet below ground surface.

(1) Fine-grained soil interval interpreted form 2012 and 2013 Electric Conductivity logs (Weston, 2014).

(green) = Location with groundwater intercepting fine grained unit.

(blue) = Location with groundwater above or below fine grained unit (<5').

Table 5-3A
Grain Size Data
The Sherwin-Williams Company
Gibbsboro, New Jersey

Soil Core Sample ID	Specific Sample Depth (feet bgs)	Water Bearing Zone(1)	Soil Analytical Laboratory Results									Soil Field Logging Information			CPT Data		
			Mean Grain Size Description USCS/ASTM	Median Grain Size mm	Particle Size Distribution, weight percent							USCS Classification	Soil USCS Interval (feet bgs)	Soil USCS Interval Description	CPT Location ID(2)	CPT SBT Interval (feet bgs)	SBT Classification
					Gravel	Sand Size			Silt	Clay	Silt/Clay						
					Coarse	Coarse	Medium	Fine									
DP-1 (15.3'-16.0')	15.3-15.5	Shallow	Fine sand	0.120	0.00	0.00	0.28	80.94	11.87	6.91	18.78	SM	15-21	Light yellowish brown, Silty Fine Sand, micaceous	NA	NA	NA
DP-2 (12.0'-12.6')	12.0-12.2	Shallow	Fine sand	0.126	0.00	0.00	0.73	81.55	11.58	6.14	17.72	SP	11-16.5	Light yellowish brown, Fine Sand, trace silt, black banding	NA	NA	NA
DP-4 (13.5'-14.2')	13.5-13.7	Shallow	Fine sand	0.115	0.00	0.00	1.10	76.24	15.42	7.24	22.66	SM	13.2-15.3	Pale brown, Silty Fine Sand, gray banding, micaceous	NA	NA	NA
DP-5 (11.5'-12.2')	11.5-11.7	Shallow	Fine sand	0.104	0.00	0.00	0.84	75.70	16.36	7.10	23.46	SM	10-13.5	Light brownish gray to gray, Silty Fine Sand	NA	NA	NA
DP-8 (12.0'-12.7')	12.0-12.2	Shallow	Fine sand	0.111	0.00	0.00	0.70	76.07	17.21	6.03	23.24	SM	10.7-16	Grayish brown to reddish gray, Silty Fine Sand, black banding	CPT/MIP-04	11.5-13.5	Silty Sand/Sand
DP-9 (8.0'-8.8')	8.6-8.8	Shallow	Fine sand	0.114	0.00	0.00	0.97	70.30	18.05	10.69	28.74	SM	6.6-13	Pale brown to grayish brown, Silty Fine Sand, black banding, micaceous	CPT/MIP-08	3.3-9	Silty Sand/Sand
DP-13 (2.2'-3.0')	2.2-2.4	Shallow	Fine sand	0.111	0.00	0.00	3.49	69.38	22.53	4.60	27.13	SP	1.8-5.5	Very dark gray, gray, light brownish gray, Fine Sand	NA	NA	NA
DP-13 (6.5'-7.2')	6.5-6.7	Shallow	Fine sand	0.093	0.00	0.00	0.00	70.99	22.48	6.53	29.01	SM	5.5-7.7	Grayish brown, Silty Fine Sand, micaceous	NA	NA	NA
DP-14 (6.8'-7.5')	6.8-7.0	Shallow	Fine sand	0.118	0.00	0.00	0.00	82.02	12.43	5.55	17.98	SM	3-8.5	Light brownish gray to light yellowish brown, Silty Fine Sand, gray banding, micaceous	NA	NA	NA
DP-14 (13.5'-14.2')	13.5-13.7	Shallow	Fine sand	0.094	0.00	0.00	0.00	73.63	19.99	6.38	26.37	SP	13.4-14	Light yellowish brown, Fine Sand, micaceous	NA	NA	NA
DP-15 (6.8'-7.4')	6.8-7.0	Shallow	Fine sand	0.118	0.00	0.00	0.81	77.25	14.98	6.96	21.93	SP	2.5-7	Gray, Fine Sand, black banding	CPT/MIP-18	6-10	Silty Sand/Sand
DP-15 (11.0'-11.7')	11.0-11.2	Shallow	Fine sand	0.124	0.00	0.00	0.00	79.55	12.92	7.53	20.45	SP	8.4-12.5	Gray to light brownish gray, Fine Sand, micaceous	CPT/MIP-18	10-12	Sand
DP-16 (3.3'-4.0')	3.3-3.7	Shallow	Gravel	1.060	33.18	7.64	24.88	27.55	NA	NA	6.75	SP	3-4	Dark gray, Gravelly Fine to Coarse Sand, angular gravel	NA	NA	NA
DP-17 (1.9'-2.5')	1.9-2.2	Shallow	Gravel	4.160	48.16	12.38	18.20	16.76	NA	NA	4.49	GP	0.5-2.3	Dark gray, Fine to Medium Gravel, angular gravel	CPT/MIP-19	0-2	Gravelly Sand/Sand
DP-17 (3.0'-3.6')	3.0-3.3	Shallow	Medium sand	0.606	5.27	9.02	51.64	29.41	NA	NA	4.66	SP	2.3-3.2	Dark grayish brown, Fine to Coarse Sand, trace gravel	CPT/MIP-19	2-4	Sand
DP-17 (4.4'-5.0')	4.4-4.6	Shallow	Silt	0.080	0.00	0.00	0.00	56.20	30.23	13.58	43.80	ML	4.3-7	Light brownish gray, Sandy Silt, trace dark brown clay	CPT/MIP-19	4.7-5	Sandy Silt
DP-18 (3.5'-4.2')	4.0-4.2	Shallow	Fine sand	0.102	0.00	0.00	0.00	74.34	16.57	9.09	25.66	SM	3.5-6.5	Grayish brown to gray, Silty Fine Sand, micaceous	CPT/MIP-21	2-5.2	Silty Sand/Sand
DP-18 (6.5'-7.2')	6.5-6.7	Shallow	Fine sand	0.087	0.00	0.00	0.00	62.51	27.25	10.24	37.49	ML	6.5-8.5	Light brownish gray, Sandy Silt	CPT/MIP-21	5.8-8	Sandy Silt
DP-20 (6.2'-6.8')	6.6-6.8	Shallow	Fine sand	0.109	0.00	0.00	0.53	75.42	17.11	6.94	24.05	SM	4.1-8	Gray, Silty Fine Sand, trace gravel, micaceous, black staining	CPT/MIP-25	5.2-9	Silty Sand/Sand
DP-20 (8.0'-8.8')	8.0-8.2	Shallow	Fine sand	0.113	0.00	0.00	0.00	78.38	14.80	6.83	21.62	SP	8-9	Gray Sand	CPT/MIP-25	5.2-9	Silty Sand/Sand
DP-21 (10.7'-11.2')	10.7-10.9	Shallow	Fine sand	0.106	0.00	0.00	3.47	70.62	18.95	6.96	25.91	SM	9.8-11	Pale brown, Silty Fine Sand	CPT/MIP-26	9-10.5	Silty Sand/Sand
DP-21 (11.2'-11.7')	11.2-11.4	Shallow	Fine sand	0.097	0.00	0.00	0.64	63.64	25.48	10.25	35.72				CPT/MIP-26	10.5-11.2	Sandy Silt
DP-21 (14.0'-14.6')	14.0-14.6	Shallow	Fine sand	0.133	0.00	0.00	0.94	86.46	7.85	4.75	12.60	SP	13-15	Gray to light yellowish brown, Fine to Medium Sand, micaceous	CPT/MIP-26	14-15	Silty Sand/Sand
DP-21 (16.9'-17.3')	17.1-17.3	Shallow	Fine sand	0.109	0.00	0.00	0.76	76.40	16.51	6.33	22.84	SM	15-17.5	Light brownish gray, Silty Fine Sand, micaceous	CPT/MIP-26	11.2-15.8	Silty Sand/Sand
DP-22 (7.3'-8.0')	7.5-7.7	Shallow	Fine sand	0.142	0.00	3.56	26.59	63.46	NA	NA	6.39	SM/SP	4.5-10	Grayish brown, Silty Fine Sand to Sand, trace gravel	CPT/MIP-27	5.5-7.5	Sandy Silt
DP-22 (11.3'-12.0')	11.8-12.0	Shallow	Fine sand	0.133	0.00	0.00	1.08	84.70	9.05	5.17	14.22	SM	10-12.5	Light brownish gray, Silty Fine Sand, black fine sand, micaceous	CPT/MIP-27	10.5-18.5	Silty Sand/Sand
DP-22 (13.5'-14.2')	13.5-13.7	Shallow	Fine sand	0.121	0.00	0.00	0.00	79.33	13.75	6.92	20.67	SM/SP	12.5-16.5	Light brownish gray, gray, Silty Fine Sand to Sand, black fine sand banding, micaceous	CPT/MIP-27	10.5-18.5	Silty Sand/Sand
DP-22 (17.7'-18.3')	17.7-17.9	Shallow	Fine sand	0.082	0.00	0.00	0.00	58.10	31.19	10.70	41.90	SM/SP	16.5-19	Light yellowish brown, Silty Fine Sand to Sand, gray sand banding, micaceous	CPT/MIP-27	10.5-18.5	Silty Sand/Sand
DP-22 (20.5'-21.0')	20.5-21.0	Shallow	Fine sand	0.097	0.00	0.00	0.00	76.09	18.29	5.62	23.91	SP	20-23.2	Gray, Fine Sand	CPT/MIP-27	18.5-22	Silty Sand/Sand
DP-23 (11.0'-11.7')	11.0-11.2	Shallow	Fine sand	0.119	0.00	0.00	1.98	71.45	16.50	10.06	26.57	SM	11-14	Pale brown, Silty Fine Sand, gray banding, micaceous	CPT/MIP-27	8.2-14.8	Silty Sand/Sand
DP-23 (14.0'-14.7')	14.0-14.2	Shallow	Fine sand	0.112	0.00	0.00	0.42	74.89	15.18	9.50	24.68	SM	14-15	Pale brown, Silty Fine Sand, black banding, micaceous	CPT/MIP-27	8.2-14.8	Silty Sand/Sand
DP-23 (16.0'-16.7')	16.0-16.2	Shallow	Fine sand	0.105	0.00	0.00	0.00	72.78	16.98	10.24	27.22	SM	15.5-18	Light brownish gray, light yellowish brown, Silty Fine Sand	CPT/MIP-27	15-20	Silty Sand/Sand
DP-24 (13.5'-14.2')	13.5-13.7	Shallow	Fine sand	0.106	0.00	0.00	0.00	73.84	17.08	9.08	26.16	SM	10-14	Light yellowish brown, Silty Fine Sand, gray fine sand	NA	NA	NA
DP-24 (17.0'-17.5')	17.0-17.2	Shallow	Fine sand	0.108	0.00	0.00	0.00	79.18	17.18	3.65	20.82	SM	14-18	Pale brown, Silty Fine Sand, trace iron oxidation and coarse sand	NA	NA	NA

Notes:
NA = not available
bgs = below ground surface
USCS = Unified Soil Classification System
ASTM = American Society for Testing and Materials
CPT = Cone Penetration Testing
SBT = Soil Behavior Type
= Indicates soil description correlation between soil analytical laboratory results, field logging, or CPT SBT data.
(1) = indicates interval within the shallow groundwater zone at the Site.
(2) = Indicates CPT location co-located to the soil core.

Table 5-3B
Total and Effective Porosity Data
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample ID	Water Bearing Zone	USCS Classification	Depth to Saturated Zone (ft bgs)	Depth (ft bgs)	Sample Orientation	Total Porosity (%Vb)	Effective Porosity (%Vb)
DP-4 (13.5'-14.2')	Shallow	SM	15.2	13.5-13.7	V	40.9	32.5
DP-9 (8.0'-8.8')	Shallow	SM	8.5	8.6-8.8	V	38.6	29.2
DP-13 (2.2'-3.0')	Shallow	SP	5.5	2.2-2.4	V	41.9	33.7
DP-14 (6.8'-7.5')	Shallow	SM	6.0	6.8-7.0	V	43.9	36.0
DP-15 (6.8' -7.4')	Shallow	SM	7.0	6.8-7.0	V	39.7	29.3
DP-17 (3.0'-3.6')	Shallow	SP	3.0	3.0-3.2	V	30.3	26.4
DP-18 (3.5'-4.2')	Shallow	SM	4.0	4.0-4.2	V	42.4	34.7
DP-20 (6.2'-6.8')	Shallow	SM	7.0	6.6-6.8	V	40.4	30.5
DP-21 (11.2'-11.7')	Shallow	SM/ML	11.2	11.2-11.4	V	40.3	22.9
DP-22 (13.5'-14.2')	Shallow	SP/SM	13.0	13.5-13.7	V	42.5	34.9
DP-23 (14.0'-14.7')	Shallow	SM	15.0	14.0-14.2	V	42.5	31.2
DP-24 (13.5'-14.2')	Shallow	SM	14.0	13.5-13.7	V	39.7	29.2

Notes:
g = grams
cc = cubic centimeter
N/A = not available
VB = bulk volume
ft bgs = feet below ground surface
USCS Classifications, water bearing zones, and depth to saturated zones sourced from boring logs
V = vertical
USCS = Unified Soil Classificaiton System

Table 5-3C
2017 Background FOC and TOC Analytical Results
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample ID	FOC-01 (7.5-8)	FOC-01 (14-14.5)	FOC-01 (18-18.5)	FOC-02 (11.5-12)	FOC-02 (19.5-20)
Sample Depth	7.5-8 FT	14-14.5 FT	18-18.5 FT	11.5-12 FT	19.5-20 FT
chemical_name	9/25/2017	9/25/2017	9/25/2017	9/25/2017	9/25/2017
Fractional Organic Carbon (g/g)	0.002	0.00053 J	0.0014 U	0.0011 U	0.0014 U
Total Organic Carbon (% g/g)	0.2	0.053 J	0.14 U	0.11 U	0.14 U

Notes:

g = grams

FT = feet below ground surface

U = not detected at or above laboratory reporting limit.

J = estimated

EHS Support consider it done

Table 5-4A
CPT Results for Fine-Grained Soil Intervals (Within 5 feet of Groundwater)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Boring ID	Area	Groundwater Depth (feet bgs)(1)	Is Fine-Grained Soil Inverals Within 5 feet of Groundwater? (Y/N)	Fine-Grained Soil Interval (feet bgs)(2)	Soil USCS Description
CPT/MIP-01	Area D	10	Y	7.5-9	Sandy Silt
CPT/MIP-02	Area D	13.5	Y	11.5-12.8, 13.5-14	Sandy Silt
CPT/MIP-03	Area D	10.8	Y	8.5-9.5, 10-11.5, 14-15	Sandy Silt
CPT/MIP-04	Area D	9.8	Y	8.5-9.5, 10.5-11.5	Sandy Silt
CPT/MIP-05	Area I	9.5	Y	6.5-11, 14-.5	Sandy Silt/Clay
CPT/MIP-06	Area I	7	Y	6.5-8, 10-10.5	Silt/Silty Clay
CPT/MIP-07	Area I	4.3	Y	5, 6.8-8.5	Sandy Silt, Silt
CPT/MIP-08	Area D	8.6	Y	9-10, 10.5-11	Sandy Silt
CPT/MIP-09	Area C	5	Y	13-13.5	Sandy Silt
CPT/MIP-10	Area C	3.5	Y	6.5-8.5	Sandy Silt
CPT/MIP-11	Area C	4.5	Y	3.7-5.2	Sandy Silt, Silt
CPT/MIP-12	Area F	7.7	Y	6-6.5, 9.5-10	Sandy Silt
CPT/MIP-13	Area F	7.8	Y	5.5-7.2	Sandy Silt
CPT/MIP-14	Area K	3.1	Y	6-26	Silt/Clayey Silt/Sandy Silt
CPT/MIP-15	Area K	2.5	Y	1.5-6	Sandy Silt/Clay
CPT/MIP-16	Area K	3.2	Y	1.7-2, 3.9-4.2, 7.2-7.7	Sandy Silt
CPT/MIP-17	Area G	14.8	Y	15.2-16.7	Sandy Silt
CPT/MIP-18	Area B	9.4	N	NA	NA
CPT/MIP-19	Area E	2.7	Y	4.7-5, 5.5-9.2	Sandy Silt/Silt
CPT/MIP-20	Area E	3.8	Y	3.2-5.2, 5.5-6, 7-11	Silt/Clayey Silt/Sandy Silt
CPT/MIP-21	Area E	2.8	Y	5.2-8	Sandy Silt
CPT/MIP-22	Area E	13.5	Y	15.2-15.7	Sandy Silt
CPT/MIP-23	Area E	3.4	Y	7	Sandy Silt
CPT/MIP-24	Area F	4.2	Y	5.2, 7-7.5	Sandy Silt
CPT/MIP-25	Area F	12.7	Y	12.7-18.2	Sandy Silt/Silt
CPT/MIP-26	Area A	12.6	Y	10.5-11	Sandy Silt
CPT/MIP-27	Area A	13.2	y	5.5-9.3, 18.3	Sandy Silt
CPT/MIP-28	Area A	12.9	Y	10-10.5	Sandy Silt
CPT/MIP-29	Area A	12.3	Y	9.5-11	Sandy Silt
CPT/MIP-30	Area A	10.8	Y	6-7, 7.7-8.2	Sandy Silt
CPT/MIP-32	Area J	15.1	N	NA	NA
CPT/MIP-33	Area J	16	N	NA	NA
CPT/MIP-34	Area J	18	Y	16.8-18	Sandy Silt
CPT/MIP-35	Area J	14	N	NA	NA
CPT/MIP-36	Area J	4.9	Y	15-16.5	Sandy Silt

Notes:
ft bgs = feet below ground surface.
Y / N = (Yes / No)
(1) Groundwater depth from CPT
(2) Fine grained soil interval from CPT SBT results.
NA = Not Applicable

Table 5-4B
Soil Logging Results for Fine Grain Soil Intervals (Within 5 feet of Historic Groundwater Levels)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Area	Convential Soil Boring Logging Intrepretation													CPT Sounding Results							
	Soil Boring Location	Ground Surface Elevation (feet amsl)	Total Boring Depth (ft bgs)	Groundwater Level Identified During Soil Logging		USCS Soil Description	Interpreted Soil Interval[1]				Vicinity Shallow Zone Well	GW Elevation Range (2010-2017) (ft amsl)		Corresponding CPT Location	Ground Surface Elevation (feet amsl)	Groundwater Level (ft bgs)	SBT Description	Interpreted Soil Interval[2]			
				(feet bgs)	(feet amsl)		Top (ft bgs)	Bottom (ft bgs)	Top (ft amsl)	Bottom (ft amsl)		Low	High					Top (ft bgs)	Bottom (ft bgs)	Top (ft amsl)	Bottom (ft amsl)
A	DP-21	98.37	40	11.2	87.17	ML (Sandy Silt)	11.5	12	86.87	86.37	MW-11	85.89	88.70	CPT/MIP17-26	98.30	12.6	Sandy Silt	10.3	11.1	88.0	87.2
A	DP-22	99.84	30	13	86.84	ML (Sandy Silt)	19	19.5	80.84	80.34	MW-11	85.89	88.70	CPT/MIP17-27	99.92	13.2	Sandy Silt	18.5	18.6	81.4	81.3
C	DP-11	90.01	20	4	86.01	ML (Sandy Silt)	3.6	3.9	86.41	86.11	MW-15	85.32	87.04	CPT/MIP17-11	90.11	4.5	Sandy Silt/Silt	4	5.1	86.1	85.0
C	DP-11	90.01	20	4	86.01	ML (Sandy Silt)	9.2	10.6	80.81	79.41	MW-15	85.32	87.04	CPT/MIP17-11	90.11	4.5	Sandy Silt	9.8	10	80.3	80.1
C	DP-11	90.01	20	4	86.01	ML (Silt)	13.4	13.6	76.61	76.41	MW-15	85.32	87.04	CPT/MIP17-11	90.11	4.5	Sandy Silt	13.1	13.5	77.0	76.6
C	DP-11	90.01	20	4	86.01	ML (Sandy Silt)	15.5	15.8	74.51	74.21	MW-15	85.32	87.04	CPT/MIP17-11	90.11	4.5	Sandy Silt	15	15.5	75.1	74.6
D	DP-08	99.15	20	10.5	88.65	ML (Sandy Silt)	9.8	10.7	89.35	88.45	MW-24	86.96	91.82	CPT/MIP17-04	98.97	9.8	Sandy Silt	8.5	11.5	90.5	87.5
D	DP-09	97.69	20	8.5	89.19	ML (Sandy Silt)	4.1	6.7	93.59	90.99	MW-24	86.96	91.82	CPT/MIP17-08	97.72	8.6	Silty Sand/Sand	3.2	9	94.5	88.7
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	4.9	7	80.05	77.95	MW-13R	82.99	84.23	CPT/MIP17-19	84.94	2.7	Sandy Silt	4.9	9.1	80.0	75.8
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	13.9	14.1	71.05	70.85	MW-13R	82.99	84.23	CPT/MIP17-19	84.94	2.7	Sandy Silt	11.8	12.3	73.1	72.6
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	15.1	16.5	69.85	68.45	MW-13R	82.99	84.23	CPT/MIP17-19	84.94	2.7	Sandy Silt/Clayey Silt/Silt	13.2	26.5	71.7	58.4
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	18	19.8	66.95	65.20	MW-13R	82.99	84.23								
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	21.5	22.2	63.45	62.75	MW-13R	82.99	84.23								
E	DP-17	84.95	40	3.3	81.65	ML (Sandy Silt)	22.7	25	62.25	59.95	MW-13R	82.99	84.23								
E	DP-18	85.57	45	4	81.57	ML (Sandy Silt)	6.5	7.3	79.07	78.32	MW-13R	82.99	84.23	CPT/MIP17-21	85.65	2.8	Sandy Silt	5.5	8	80.2	77.7
E	DP-18	85.57	45	4	81.57	ML (Sandy Silt)	7.3	8.5	78.32	77.07	MW-13R	82.99	84.23	CPT/MIP17-21	85.65	2.8	Sandy Silt	9.3	10	76.4	75.7
E	DP-18	85.57	45	4	81.57	ML (Sandy Silt)	12.0	13.0	73.57	72.57	MW-13R	82.99	84.23	CPT/MIP17-21	85.65	2.8	Sandy Silt	11	13.5	74.7	72.2
E	DP-18	85.57	45	4	81.57	ML (Sandy Silt)	16.5	18.0	69.07	67.57	MW-13R	82.99	84.23	CPT/MIP17-21	85.65	2.8	Sandy Silt	12.3	15	73.4	70.7
E	DP-18	85.57	45	4	81.57	ML (clayey silt)	18.0	19.0	67.57	66.57	MW-13R	82.99	84.23	CPT/MIP17-21	85.65	2.8	Sandy Silt/Clayey Silt/Silt	15.7	23.5	70.0	62.2
F	DP-19	85.77	40	4.7	81.07	ML (Sandy Silt)	7	7.9	78.77	77.87	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt	7	7.5	78.8	78.3
F	DP-19	85.77	40	4.7	81.07	ML (Sandy Silt)	12	12.5	73.77	73.27	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt	10	11	75.8	74.8
F	DP-19	85.77	40	4.7	81.07	ML (Sandy Silt)	13	13.5	72.77	72.27	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt	11.8	13.1	74.0	72.7
F	DP-19	85.77	40	4.7	81.07	ML (Sandy Silt)	17.5	18.7	68.27	67.07	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt/Clayey Silt/Silt	13.8	17.5	72.0	68.3
F	DP-19	85.77	40	4.7	81.07	ML (Silt)	19.3	20	66.47	65.77	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt/Clayey Silt/Silt	18.5	20	67.3	65.8
F	DP-19	85.77	40	4.7	81.07	ML (Silt)	21.5	22	64.27	63.77	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt/Clayey Silt/Silt	20.6	24.5	65.2	61.3
F	DP-19	85.77	40	4.7	81.07	ML (Silt)	22.5	23.3	63.27	62.47	MW-13R	82.99	84.23	CPT/MIP17-24	85.78	4.2	Sandy Silt/Clayey Silt/Silt			85.8	85.8
F	DP-20	89.84	40	7	82.84	ML (Sandy Silt)	14.3	14.8	75.59	75.09	MW-21	81.68	84.28	CPT/MIP17-25	89.73	12.7	Sandy Silt	12.5	18.2	77.2	71.5
F	DP-20	89.84	40	7	82.84	ML (Sandy Silt)	16.0	17.5	73.84	72.34	MW-21	81.68	84.28	CPT/MIP17-25	89.73	12.7	Sandy Silt			89.7	89.7
F	DP-20	89.84	40	7	82.84	ML (Sandy Silt)	19.0	19.8	70.84	70.04	MW-21	81.68	84.28	CPT/MIP17-25	89.73	12.7	Sandy Silt/Silt	19	21	70.7	68.7
F	DP-20	89.84	40	7	82.84	ML (Sandy Silt)	20.8	21.1	69.09	68.74	MW-21	81.68	84.28	CPT/MIP17-25	89.73	12.7	Sandy Silt/Silt			89.7	89.7
F	DP-20	89.84	40	7	82.84	ML (Sandy Silt)	24.0	25.0	65.84	64.84	MW-21	81.68	84.28	CPT/MIP17-25	89.73	12.7	Sandy Silt	23	24.8	66.7	64.9
G	DP-12	99.89	25	15	84.89	ML (Silt)	15	15.2	84.89	84.69	MW-26	84.05	87.55	CPT/MIP17-17	99.92	14.8	Sandy Silt/Silt	15.2	16.7	84.7	83.2
H	DP-01	102.55	25	15.1	87.45	ML (Sandy Silt)	22.0	23.0	80.55	79.55	MW-11	85.89	88.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-01	102.55	25	15.1	87.45	ML (Clayey Silt)	23.0	23.5	79.55	79.05	MW-11	85.89	88.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-02	97.97	25	14.3	83.67	ML (Sandy Silt)	16.5	17.0	81.47	80.97	MW-26	84.05	87.55	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-03	97.11	25	13	84.11	ML (Sandy Silt)	13.4	15.0	83.71	82.11	WP-8	86.95	90.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-03	97.11	25	13	84.11	ML (Sandy Silt)	24.0	24.5	73.11	72.61	WP-8	86.95	90.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-04	99.42	25	15	84.42	ML (Sandy Silt)	12.8	13.1	86.62	86.32	WP-8	86.95	90.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-04	99.42	25	15	84.42	ML (Sandy Silt)	24.5	25.0	74.92	74.42	WP-8	86.95	90.70	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-05	97.11	25	11.5	85.61	ML (Sandy Silt)	12.3	13.9	84.81	83.21	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-05	97.11	25	11.5	85.61	ML (Sandy Silt)	16.3	16.8	80.86	80.36	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-05	97.11	25	11.5	85.61	ML (Sandy Silt)	23.5	24.5	73.61	72.61	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-05	97.11	25	11.5	85.61	ML (Clayey Silt)	24.5	24.8	72.61	72.36	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-06	94.03	25	15	79.03	ML (Clayey Silt)	18.5	19.0	75.53	75.03	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-06	94.03	25	15	79.03	ML (Clayey Silt)	24.4	24.7	69.63	69.33	MW-13R	82.99	84.23	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-07	92.32	25	10.5	81.82	ML (Sandy Silt)	18	19	74.32	73.32	MW-21	81.68	84.28	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-07	92.32	25	10.5	81.82	ML (Sandy Silt)	19.25	19.5	73.07	72.82	MW-21	81.68	84.28	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-07	92.32	25	10.5	81.82	ML (Sandy Silt)	19.75	20	72.57	72.32	MW-21	81.68	84.28	NA	NA	NA	NA	NA	NA	NA	NA
H	DP-07	92.32	25	10.5	81.82	ML (Sandy Silt)	22.5	23	69.82	69.32	MW-21	81.68	84.28	NA	NA	NA	NA	NA	NA	NA	NA
I	DP-10	88.35	10	4	84.35	ML (Sandy Silt)	7.5	8	80.85	80.35	MW-15	85.32	87.04	CPT/MIP17-07	88.18	4.3	Sandy Silt/Silt	6.5	8.5	81.7	79.7
J	DP-24	99.89	25	14	85.89	ML (Sandy Silt)	23.5	25	76.39	74.89	MW-27	85.24	94.63	CPT/MIP-34	100.72	18	Sandy Silt	21.8	22.8	78.9	77.9

Table 5-4B
Soil Logging Results for Fine Grain Soil Intervals (Within 5 feet of Historic Groundwater Levels)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Area	Conventional Soil Boring Logging Intrepretation													CPT Sounding Results							
	Soil Boring Location	Ground Surface Elevation (feet amsl)	Total Boring Depth (ft bgs)	Groundwater Level Identified During Soil Logging		USCS Soil Description	Interpreted Soil Interval[1]				Vicinity Shallow Zone Well	GW Elevation Range (2010-2017) (ft amsl)		Corresponding CPT Location	Ground Surface Elevation (feet amsl)	Groundwater Level (ft bgs)	SBT Description	Interpreted Soil Interval[2]			
				(feet bgs)	(feet amsl)		Top (ft bgs)	Bottom (ft bgs)	Top (ft amsl)	Bottom (ft amsl)		Low	High					Top (ft bgs)	Bottom (ft bgs)	Top (ft amsl)	Bottom (ft amsl)
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	9.9	10.5	78.63	78.03	MPMW0009	83.96	85.36	CPT/MIP17-16	86.36	3.4	Sandy Silt	8.2	8.4	78.2	78.0
														CPT/MIP17-16	86.36	3.4	Sandy Silt	9.1	9.3	77.3	77.1
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	18.3	18.6	70.23	69.93	MPMW0009	83.96	85.36	CPT/MIP17-16	86.36	3.4	Sandy Silt/Clayey Silt/Silt	14	28.8	72.4	57.6
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	19.4	21.5	69.13	67.03	MPMW0009	83.96	85.36								
K	DP-13	88.53	45	5.5	83.03	CL (Clay)	23.2	23.5	65.33	65.03	MPMW0009	83.96	85.36								
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	23.5	24	65.03	64.53	MPMW0009	83.96	85.36								
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	24.5	26	64.03	62.53	MPMW0009	83.96	85.36								
K	DP-13	88.53	45	5.5	83.03	ML (Sandy Silt)	27	29.9	61.53	58.63	MPMW0009	83.96	85.36								
K	DP-14	90.98	45	5.8	85.18	ML (Sandy Silt)	10.1	11	80.88	79.98	WP-8	86.95	90.70	CPT/MIP17-20	86.80	3.8	Sandy Silt	9.7	11	77.1	75.8
K	DP-14	90.98	45	5.8	85.18	ML (Sandy Silt)	15.8	16.6	75.18	74.38	WP-8	86.95	90.70	CPT/MIP17-20	86.80	3.8	Sandy Silt	14.5	15	72.3	71.8
K	DP-16	85.14	40	5.5	79.64	ML (Sandy Silt)	7.9	8.4	77.24	76.74	MW-14	82.44	83.30	CPT/MIP17-15	84.98	2.4	Sandy Silt	8.5	12.5	76.5	72.5
K	DP-16	85.14	40	5.5	79.64	ML (Clayey Silt)	9.5	10	75.64	75.14	MW-14	82.44	83.30								
K	DP-16	85.14	40	5.5	79.64	ML (Clayey Silt)	12.5	13.25	72.64	71.89	MW-14	82.44	83.30	CPT/MIP17-15	84.98	2.4	Clayey Silt/Silt	13.5	13.8	71.5	71.2
K	DP-16	85.14	40	5.5	79.64	ML (Clayey Silt)	18.5	20	66.64	65.14	MW-14	82.44	83.30	CPT/MIP17-15	84.98	2.4	Clayey Silt/Silt	17	20.5	68.0	64.5

Notes:
No CPT/MIP borings were completed in Area H
(1) = Soil lithlogy from soil core observation and logging activities.
(2) = Soil description based on Soil Behavior Type (SBT) results from Cone Penetration Testing (CPT).
ft bgs = feet below ground surface
ft amsl = feet above mean sea level
USCS = Unified Soil Classificaition System
= Location with groundwater intercepting fine grained unit.
= Location with groundwater above or below fine grained unit (<5 feet).

Table 5-5
Groundwater Monitoring Well Construction Details
The Sherwin-Williams Company
Gibbsboro, New Jersey

MONITORING WELL ID	MONITORING WELL PERMIT#	Type of Well	WELL DIAMETER (INCHES)	TOTAL WELL DEPTH (ft bgs)	SCREEN LENGTH (ft)	GROUND SURFACE ELEVATION (ft amsl)	TOP SCREEN ELEVATION (ft amsl)	BOTTOM SCREEN ELEVATION (ft amsl)	TOP OF INNER PVC CASING ELEVATION (ft amsl)	TOP OF OUTER CASING ELEVATION (ft amsl)
FMP Site										
MW-1	NA	Stick-up	4	27	20	104.8	98	78	107.19	NA
MW-2	31-37548	Stick-up	4	15	10	85.5	81	71	86.79	NA
MW-3	31-18080	Stick-up	4	20	10	90.5	81	71	91.04	NA
MW-4	31-18082	Stick-up	4	20	10	87.54	78	68	87.54	NA
MW-6	NA	Stick-up	2	9	4	85.35	80	76	86.99	NA
MW-11	31-37540	Flushmounted	4	16	10	97.7	92	82	97.42	97.65
MW-12	31-37541	Flushmounted	4	16	10	98.07	92	82	97.54	NA
MW-13R	31-46984	Stick-up	4	12	10	87.1	85	75	89.79	90.69
MW-14	31-37543	Flushmounted	4	11	10	85.32	84	74	85.07	NA
MW-15	31-37544	Flushmounted	4	12	10	90.24	88	78	89.89	NA
MW-16	31-37545	Flushmounted	4	12	10	90.6	89	79	89.97	NA
MW-17	31-37546	Flushmounted	4	15	10	89.34	84	74	89.03	NA
MW-18	31-37547	Flushmounted	4	15	10	91.05	86	76	90.54	NA
MW-21	31-40160	Flushmounted	4	14	10	91.00	87	77	90.67	NA
MW-23	31-40161	Stick-up	4	17	10	90.72	84	74	93.65	NA
MW-24	31-40152	Flushmounted	4	18	10	102.9	95	85	102.61	NA
MW-25	31-40153	Flushmounted	4	22	10	106.7	95	85	106.09	NA
MW-26	31-40154	Flushmounted	4	20	10	100.23	90	80	99.74	NA
MW-27	31-40155	Flushmounted	4	21	10	101.02	90	80	100.71	NA
MW-28	31-31651	Stick-up	2	32	15	113.1	96	81	115.01	115.18
MW-29	31-40983	Flushmounted	4	24	15	100.93	92	77	100.73	NA
MW-38	31-54973	Stick-up	4	15	10	84.28	79	69	86.77	87.13
MW-SCAR	31-31642	Stick-up	4	13	10	94.07	91	81	96.27	96.61
MPMW0001	E201302578	Flushmounted	2	13.5	10	87.9	84	74	87.51	87.89
MPMW0005	E201303756	Flushmounted	2	19	10	103.4	94	84	103.15	103.41
MPMW0008	E201303755	Flushmounted	2	22	10	98.6	87	77	98.36	98.60
MPMW0009	E201304829	Flushmounted	2	12	10	86.2	84	74	85.86	86.22
MPMW0011	E201304831	Flushmounted	2	15	10	87.2	82	72	86.61	87.18
MPMW0017	E201510034	Flushmounted	2	12	10	88.37	86	76	87.92	88.37
MPMW0024	E201510044	Stick-up	2	16.5	10	87.40	81	71	89.82	90.08
MPMW0027	E201510068	Stick-up	2	14.5	10	85.42	81	71	87.42	88.27
MPMW0030	E201510074	Flushmounted	2	12	10	79.51	78	68	79.08	79.51

Table 5-5
Groundwater Monitoring Well Construction Details
The Sherwin-Williams Company
Gibbsboro, New Jersey

MONITORING WELL ID	MONITORING WELL PERMIT#	Type of Well	WELL DIAMETER (INCHES)	TOTAL WELL DEPTH (ft bgs)	SCREEN LENGTH (ft)	GROUND SURFACE ELEVATION (ft amsl)	TOP SCREEN ELEVATION (ft amsl)	BOTTOM SCREEN ELEVATION (ft amsl)	TOP OF INNER PVC CASING ELEVATION (ft amsl)	TOP OF OUTER CASING ELEVATION (ft amsl)
MPMW0032	E201510076	Flushmounted	2	13	10	88.42	85	75	88.05	88.42
MWMP0034	E201707578	Stick-up	2	15	10	88.80	84	74	91.47	91.88
MWMP0044	E201707594	Stick-up	2	14	10	82.97	79	69	85.84	86.10
MWMP0046	E201707598	Stick-up	2	15	10	84.02	79	69	86.56	87.58
MWMP0048	E201707608	Stick-up	2	14	10	69.57	66	56	72.33	72.74
MWMP0049	E201707606	Flushmounted	2	15	10	89.37	84	74	89.03	89.38

Notes:

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

Well construction specifications for the FMP and 1981 Burn Site wells taken from boring logs and Well Construction Logs.

NA = Not Available

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)
								8/2/2010		4/14/2011		8/24/2011		11/21/2011		2/28/2012		5/16/2012		8/7/2012		11/20/2012	
Shallow Wells																							
Burn	Shallow	BSMW0001	3	13	NAVD88	83.25	83.25	6.73	76.52	5.20	78.05	6.03	77.22	5.59	77.66	5.57	77.68	5.61	77.64	6.80	76.45	6.33	76.92
Burn	Shallow	BSMW0002	3	13	NAVD88	82.05	82.05	6.66	75.39	5.92	76.13	6.18	75.87	6.03	76.02	6.12	75.93	6.08	75.97	6.56	75.49	6.32	75.73
Burn	Shallow	BSMW0003	2	12	NAVD88	79.39	79.39	3.87	75.52	3.18	76.21	3.45	75.94	3.25	76.14	3.46	75.93	3.26	76.13	3.75	75.64	3.64	75.75
Burn	Shallow	BSMW0004	3	13	NAVD88	82.22	82.22	7.18	75.04	6.48	75.74	6.72	75.50	6.61	75.61	6.71	75.51	6.63	75.59	7.14	75.08	6.94	75.28
Burn	Shallow	BSMW0005	2	12	NAVD88	83.67	83.67	7.46	76.21	5.17	78.50	5.42	78.25	5.29	78.38	5.40	78.27	5.17	78.50	7.57	76.10	6.47	77.20
Burn	Shallow	BSMW0006	2	12	NAVD88	86.22	86.22	--	--	3.12	83.10	3.60	82.62	3.26	82.96	3.33	82.89	3.09	83.13	6.42	79.80	4.49	81.73
Burn	Shallow	BSMW0007	2	12	NAVD88	84.08	84.08	5.12	78.96	4.52	79.56	4.82	79.26	4.58	79.50	4.64	79.44	4.66	79.42	5.19	78.89	4.78	79.30
Burn	Shallow	MW-7	5	15	NAVD88	81.29	81.29	--	--	3.39	77.90	3.69	77.60	3.65	77.64	3.81	77.48	3.56	77.73	4.90	76.39	4.11	77.18
Burn	Shallow	MW-8	5	15	NAVD88	84.24	84.24	5.89	78.35	3.78	80.46	4.17	80.07	4.22	80.02	4.43	79.81	3.93	80.31	6.35	77.89	5.16	79.08
Burn	Shallow	MW-9	10	20	NAVD88	87.46	87.46	8.59	78.87	7.23	80.23	7.59	79.87	7.49	79.97	7.63	79.83	7.42	80.04	8.85	78.61	7.93	79.53
Burn	Shallow	MW-10	5	15	NAVD88	88.17	88.17	--	--	4.17	84.00	4.83	83.34	4.50	83.67	4.57	83.60	4.37	83.80	6.41	81.76	5.34	82.83
Burn	Shallow	MW-40A	5	15	NAVD88	83.41	83.41	8.10	75.31	6.65	76.76	6.94	76.47	7.01	76.40	7.35	76.06	6.89	76.52	8.13	75.28	7.61	75.80
Burn	Shallow	RRMW0001	2	12	NAVD88	79.71	79.71	4.68	75.03	3.85	75.86	4.13	75.58	3.86	75.85	4.13	75.58	3.91	75.80	4.56	75.15	4.31	75.40
Burn	Shallow	RRMW0002	2	12	NAVD88	79.54	79.54	4.74	74.80	4.10	75.44	4.34	75.20	4.07	75.47	4.29	75.25	4.19	75.35	4.64	74.90	4.49	75.05
FMP	Shallow	MPMW0001	3.5	13.5	NAVD88	87.51	87.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0005	9	19	NAVD88	103.15	103.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0008	12	22	NAVD88	98.36	98.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0009	2	12	NAVD88	85.86	85.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0011	5	15	NAVD88	86.61	86.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0017	2	12	NAVD88	87.92	87.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0024	6.5	16.5	NAVD88	89.92	89.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0027	4.5	14.5	NAVD88	87.42	87.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0030	2	12	NAVD88	79.08	79.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0032	3	13	NAVD88	88.05	88.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0034	5	15	NAVD88	91.47	91.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0044	4	14	NAVD88	85.84	85.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0046	5	15	NAVD88	86.56	86.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0049	5	15	NAVD88	89.10	89.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MW-2	5	15	NGVD29	86.79	85.635	7.72	77.92	5.19	80.45	6.60	79.04	6.2	79.44	6.24	79.40	6.34	79.30	8.13	77.51	7.33	78.31
FMP	Shallow	MW-3	10	20	NGVD29	91.04	89.885	8.98	80.91	7.10	82.79	8.70	81.19	7.8	82.09	7.7	82.19	7.97	81.92	9.62	80.27	9.26	80.63
FMP	Shallow	MW-4	9.4	19.4	NAVD88	88.41	88.41	7.81	80.60	5.74	82.67	7.23	81.18	6.38	82.03	6.28	82.13	6.31	82.10	8.22	80.19	7.79	80.62
FMP	Shallow	MW-6	5	9	NGVD29	86.99	85.835	5.33	80.51	2.80	83.04	3.49	82.35	3.40	82.44	3.49	82.35	3.22	82.62	5.38	80.46	4.5	81.34
FMP	Shallow	MW-11	5.73	15.73	NAVD88	97.25	97.25	10.05 (0.24)	87.48	11.45	85.89	10.52 (0.18)	86.96	9.53 (0.01)	87.81	9.67 (0.25)	87.87	9.88 (0.09)	87.53	10.78 (0.2)	86.72	11.80 (1.05)	86.38
FMP	Shallow	MW-12	6	16	NGVD29	97.54	96.385	8.36	88.03	7.96	88.43	8.84	87.55	8.10	88.29	8.03	88.36	8.34	88.05	9.14	87.25	10.02 (0.67)	86.94
FMP	Shallow	MW-13R	2.25	12.25	NAVD88	89.63	89.63	5.96	83.67	5.56	84.07	6.25	83.38	5.84	83.79	6.08	83.55	6.19	83.44	6.45 (0.01)	83.19	6.64	82.99
FMP	Shallow	MW-14	1	11	NGVD29	85.07	83.915	1.32	82.60	0.56	83.36	1.13	82.79	0.95	82.97	0.9	83.02	0.95	82.97	1.30	82.62	1.48	82.44
FMP	Shallow	MW-15	2	12	NGVD29	89.89	88.735	2.78	85.96	2.50	86.24	3.00	85.74	2.53	86.21	2.39	86.35	2.65	86.09	3.26	85.48	3.42	85.32
FMP	Shallow	MW-16	2	12	NGVD29	89.97	88.815	2.90	85.92	2.56	86.26	2.68	86.14	2.59	86.23	2.59	86.23	2.76	86.06	3.22	85.60	3.45	85.37
FMP	Shallow	MW-17	5	15	NGVD29	89.03	87.875	5.53	82.35	5.37	82.51	5.33	82.55	5.14	82.74	5.31	82.57	5.38	82.50	5.94	81.94	4.78	83.10
FMP	Shallow	MW-18	5	15	NGVD29	90.54	89.385	9.16	80.23	8.75	80.64	9.06	80.33	8.97	80.42	7.81	81.58	8.88	80.51	9.01	80.38	9.1	80.29
FMP	Shallow	MW-21	4	14	NGVD29	90.67	89.515	7.94 (1.32)	82.67	5.44	84.08	7.89 (0.02)	81.68	5.99 (0.01)	83.57	6.01	83.51	6.35 (0.03)	83.23	7.57 (0.01)	81.99	7.51 (0.01)	82.05
FMP	Shallow	MW-23	7.07	17.07	NGVD29	93.65	92.495	14.47	78.03	12.58	79.92	14.22	78.28	13.20	79.30	13.15	79.35	13.51	78.99	14.94	77.56	14.61	77.89
FMP	Shallow	MW-24	8	18	NGVD29	102.61	101.455	11.08	90.38	10.63	90.83	11.22	90.24	10.74	90.72	10.66	90.80	10.9	90.56	14.54	86.96	12.02	89.44
FMP	Shallow	MW-25	11.56	21.56	NGVD29	106.09	104.935	15.02	89.92	14.34	90.60	15.62	89.32	14.64	90.30	14.51	90.43	14.97	89.97	16.00	88.94	16.36	88.58
FMP	Shallow	MW-26	10.2	20.2	NGVD29	99.74	98.585	12.61 (0.03)	86.04	11.82	86.77	13.21 (0.148)	85.53	12.03 (0.01)	86.60	12.00	86.59	12.49 (0.01)	86.14	13.44	85.15	14.72 (0.18)	84.05
FMP	Shallow	MW-27	11	21	NGVD29	100.71	99.555	13.15	86.41	12.23	87.33	--	--	12.50	87.06	12.45	87.11	12.98	86.58	13.96 (0.01)	85.64	14.92 (0.17)	85.24
FMP	Shallow	MW-38	5	15	NAVD88	86.77	86.77	10.53	76.24	9.02	77.75	9.98	76.79	9.38	77.39	9.41	77.36	9.67	77.10	10.68	76.09	10.39	76.38
FMP	Shallow	MW-SCAR	3	13	NAVD88	96.27	96.27	4.98	91.29	4.34	91.93	4.61	91.66	4.31	91.96	4.35	91.92	4.32	91.95	5.25	91.02	5.13	91.14
Seep	Shallow	H-1P			NGVD29	90.56	89.405	--	--	--	--	--	--	6.10 (0.01)	83.35	--	--	6.24 (0.01)	83.21	6.62 (0.01)	82.83	--	--

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)
								8/2/2010		4/14/2011		8/24/2011		11/21/2011		2/28/2012		5/16/2012		8/7/2012		11/20/2012	
Seep	Shallow	H-3P			NGVD29	89.9	88.745	7.18 (1.26)	82.62	--	--	--	--	6.82 (0.36)	82.26	--	--	7.00 (0.29)	82.02	7.02 (0.14)	81.88	--	--
Seep	Shallow	SVE-1	1	11	NGVD29	89.06	87.905	--	--	--	--	--	--	4.33	83.58	--	--	4.60	83.31	4.99	82.92	--	--
Seep	Shallow	SVE-2	1	11	NGVD29	90.38	89.225	--	--	--	--	--	--	6.03	83.20	--	--	6.67	82.56	7.63	81.60	--	--
Seep	Shallow	SVE-3	0.755	10.755	NGVD29	89.65	88.495	--	--	--	--	--	--	6.42	82.08	--	--	6.99	81.51	8.03	80.47	--	--
Seep	Shallow	SVE-4	8	18	NGVD29	94.48	93.325	--	--	--	--	--	--	9.35	83.98	--	--	9.81	83.52	10.61	82.72	--	--
Seep	Shallow	SVE-5	3.5	13.5	NGVD29	90.18	89.025	--	--	--	--	--	--	5.21	83.82	--	--	5.52 (0.07)	83.60	6.49 (0.01)	82.58	--	--
Seep	Shallow	SVE-6	5	15	NGVD29	90.88	89.725	--	--	--	--	--	--	5.81	83.92	--	--	6.26	83.46	7.34 (0.24)	82.62	--	--
Seep	Shallow	SVE-7	4	14	NGVD29	90.27	89.115	--	--	--	--	--	--	5.7	83.42	--	--	6.14	82.98	6.76 (0.01)	82.40	--	--
Seep	Shallow	SVE-8	4.5	14.5	NGVD29	88.95	87.795	--	--	--	--	--	--	4.8	83.00	--	--	5.23	82.57	5.88	81.92	--	--
Seep	Shallow	SVE-9	5	20	NGVD29	93.11	91.955	--	--	--	--	--	--	8.42	83.54	--	--	8.69	83.27	9.65 (0.01)	82.35	--	--
Seep	Shallow	SVE-10	5	20	NGVD29	93.36	92.205	--	--	--	--	--	--	8.99	83.22	--	--	9.42	82.79	10.27	81.94	--	--
Seep	Shallow	SVE-11	5	15	NGVD29	91.45	90.295	--	--	--	--	--	--	7.31	82.99	--	--	7.80	82.50	8.78	81.52	--	--
Seep	Shallow	SVE-12	4.5	14.5	NGVD29	91.37	90.215	--	--	--	--	--	--	7.53	82.69	--	--	7.98	82.24	9.19	81.03	--	--
Seep	Shallow	WP-1			NGVD29	93.34	92.185	--	--	--	--	--	--	7.57 (0.29)	84.89	--	--	7.81 (0.05)	84.46	8.89 (0.26)	83.54	--	--
Seep	Shallow	WP-7	13	18	NGVD29	104.64	103.485	--	--	--	--	--	--	--	--	--	--	--	--	17.39	86.10	--	--
Seep	Shallow	WP-8	5	10	NGVD29	97.25	96.095	--	--	--	--	--	--	--	--	--	--	--	--	8.95	87.15	--	--
Seep	Shallow	WP-14	1	6	NGVD29	87.44	86.285	--	--	--	--	--	--	1.49	84.80	--	--	2.48 (0.01)	83.85	2.87 (0.01)	83.46	--	--
Seep	Shallow	WP-17	1	6	NGVD29	84.84	83.685	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Seep	Shallow	WP-18			NGVD29	92.40	91.245	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Seep	Shallow	WP-20			NGVD29	91.35	90.195	--	--	--	--	--	--	--	--	--	--	7.15	83.04	8.60	81.60	--	--
Seep	Shallow	WP-21			NGVD29	90.59	89.435	--	--	--	--	--	--	--	--	--	--	6.64	82.80	7.34	82.10	--	--
Shallow-Intermediate Wells																							
FMP	Shallow-Intermediate	MW-1	5.83	25.83	NAVD88	105.67	105.67	17.08 (0.02)	89.01	16.46	89.62	17.71 (0.01)	88.37	16.69	89.39	16.61	89.47	17.05	89.03	18.03	88.05	18.41	87.67
FMP	Shallow-Intermediate	MW-28	16.79	31.79	NAVD88	114.85	114.85	23.22	91.63	22.64	92.21	23.84	91.01	22.97	91.88	22.71	92.14	23.06	91.79	24.21	90.64	24.53	90.32
FMP	Shallow-Intermediate	MW-29	9.00	24.00	NGVD29	100.73	99.575	14.50	85.08	13.45	86.13	14.91	84.67	13.71	85.87	13.71	85.87	14.25	85.33	15.38	84.20	15.61	83.97

Notes:

Data point is suspect and was not used interpolations.

Well exhibited a product thickness of >0.1 feet at the time of gauging. All data were corrected for any product thickness using an LNAPL density of 0.8 g/mL but only product thickness >0.1 feet are highlighted here.

Artesian condition observed and the TOC elevation used in interpolation.

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

ft BTIC = feet below top of inner casing

EHS Support consider it done

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)
								2/20/2013		5/20/2013		8/16/2013		11/20/2013		4/2/2014		6/23/2014		11/20/2014		3/12/2015	
Shallow Wells																							
Burn	Shallow	BSMW0001	3	13	NAVD88	83.25	83.25	5.68	77.57	5.75	77.50	6.04	77.21	6.3	76.95	4.57	78.68	3.89	79.36	6.11	77.14	4.76	78.49
Burn	Shallow	BSMW0002	3	13	NAVD88	82.05	82.05	6.12	75.93	6.25	75.80	6.30	75.75	6.34	75.71	5.78	76.27	6.29	75.76	6.13	75.92	5.78	76.27
Burn	Shallow	BSMW0003	2	12	NAVD88	79.39	79.39	3.41	75.98	3.36	76.03	3.50	75.89	3.62	75.77	3.02	76.37	3.47	75.92	3.37	76.02	2.99	76.40
Burn	Shallow	BSMW0004	3	13	NAVD88	82.22	82.22	6.62	75.60	6.83	75.39	6.88	75.34	6.99	75.23	6.29	75.93	6.82	75.40	6.73	75.49	6.21	76.01
Burn	Shallow	BSMW0005	2	12	NAVD88	83.67	83.67	5.21	78.46	6.25	77.42	5.65	78.02	6.98	76.69	5.05	78.62	6.55	77.12	6.11	77.56	4.95	78.72
Burn	Shallow	BSMW0006	2	12	NAVD88	86.22	86.22	3.18	83.04	3.99	82.23	3.63	82.59	5.3	80.92	2.92	83.30	4.55	81.67	3.88	82.34	2.93	83.29
Burn	Shallow	BSMW0007	2	12	NAVD88	84.08	84.08	4.45	79.63	4.85	79.23	5.02	79.06	4.9	79.18	4.34	79.74	4.97	79.11	5.73	78.35	4.36	79.72
Burn	Shallow	MW-7	5	15	NAVD88	81.29	81.29	3.51	77.78	3.98	77.31	3.92	77.37	3.92	77.37	4.11	77.18	4.18	77.11	3.91	77.38	3.03	78.26
Burn	Shallow	MW-8	5	15	NAVD88	84.24	84.24	3.93	80.31	4.81	79.43	4.41	79.83	5.61	78.63	3.28	80.96	5.18	79.06	4.52	79.72	3.15	81.09
Burn	Shallow	MW-9	10	20	NAVD88	87.46	87.46	7.34	80.12	7.84	79.62	7.91	79.55	8.18	79.28	6.80	80.66	8.09	79.37	7.75	79.71	6.8	80.66
Burn	Shallow	MW-10	5	15	NAVD88	88.17	88.17	4.43	83.74	4.91	83.26	4.90	83.27	5.41	82.76	3.65	84.52	5.08	83.09	4.85	83.32	3.63	84.54
Burn	Shallow	MW-40A	5	15	NAVD88	83.41	83.41	6.77	76.64	7.37	76.04	7.21	76.20	7.88	75.53	6.51	76.90	7.52	75.89	7.42	75.99	6.49	76.92
Burn	Shallow	RRMW0001	2	12	NAVD88	79.71	79.71	3.87	75.84	4.38	75.33	4.31	75.40	4.42	75.29	3.66	76.05	4.49	75.22	4.11	75.60	4.57	75.14
Burn	Shallow	RRMW0002	2	12	NAVD88	79.54	79.54	4.16	75.38	4.45	75.09	4.50	75.04	4.52	75.02	3.93	75.61	4.59	74.95	4.34	75.20	3.92	75.62
FMP	Shallow	MPMW0001	3.5	13.5	NAVD88	87.51	87.51	--	--	4.90	82.61	4.94	82.57	5.09	82.42	4.22	83.29	4.69	82.82	4.78	82.73	4.18	83.33
FMP	Shallow	MPMW0005	9	19	NAVD88	103.15	103.15	--	--	12.27	90.88	12.37	90.78	12.93	90.22	10.85	92.30	11.66	91.49	13.05	90.10	10.57	92.58
FMP	Shallow	MPMW0008	12	22	NAVD88	98.36	98.36	--	--	--	--	15.43	82.93	16.08	82.28	13.72	84.64	14.56	83.80	16.47	81.89	14.52	83.84
FMP	Shallow	MPMW0009	2	12	NAVD88	85.86	85.86	--	--	1.64	84.22	1.38	84.48	1.69	84.17	0.73	85.13	1.15	84.71	1.47	84.39	0.5	85.36
FMP	Shallow	MPMW0011	5	15	NAVD88	86.61	86.61	--	--	3.55	83.06	3.25	83.36	3.51	83.10	2.50	84.11	3.15	83.46	3.46	83.15	2.63	83.98
FMP	Shallow	MPMW0017	2	12	NAVD88	87.92	87.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0024	6.5	16.5	NAVD88	89.92	89.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0027	4.5	14.5	NAVD88	87.42	87.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0030	2	12	NAVD88	79.08	79.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0032	3	13	NAVD88	88.05	88.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0034	5	15	NAVD88	91.47	91.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0044	4	14	NAVD88	85.84	85.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0046	5	15	NAVD88	86.56	86.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MPMW0049	5	15	NAVD88	89.10	89.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FMP	Shallow	MW-2	5	15	NGVD29	86.79	85.635	5.95	79.69	6.55	79.09	6.65	78.99	7.48	78.16	4.48	81.16	6.72	78.92	7.07	78.57	4.48	81.16
FMP	Shallow	MW-3	10	20	NGVD29	91.04	89.885	7.97	81.92	8.12	81.77	8.31	81.58	9.08	80.81	6.30	83.59	7.57	82.32	9.18	80.71	6.85	83.04
FMP	Shallow	MW-4	9.4	19.4	NAVD88	88.41	88.41	6.42	81.99	6.65	81.76	6.9	81.51	7.6	80.81	4.34	84.07	5.62	82.79	9.88	78.53	6.86	81.55
FMP	Shallow	MW-6	5	9	NGVD29	86.99	85.835	3.24	82.60	3.95	81.89	3.67	82.17	4.87	80.97	2.48	83.36	4.55	81.29	3.77	82.07	2.6	83.24
FMP	Shallow	MW-11	5.73	15.73	NAVD88	97.25	97.25	10.27	87.07	9.87	87.47	9.81	87.44	10.95	86.30	8.55	88.70	9.32 (0.43)	88.27	11.57 (1.04)	86.51	9.52 (0.30)	87.97
FMP	Shallow	MW-12	6	16	NGVD29	97.54	96.385	8.90 (0.17)	87.66	8.38	88.01	8.37	88.02	9.02	87.37	7.24	89.15	7.5	88.89	9.22	87.17	7.89	88.50
FMP	Shallow	MW-13R	2.25	12.25	NAVD88	89.63	89.63	6.18	83.45	6.11	83.52	6.09	83.54	6.47	83.16	5.4	84.23	5.67	83.96	6.48	83.15	5.69	83.94
FMP	Shallow	MW-14	1	11	NGVD29	85.07	83.915	1.24	82.68	1.28	82.64	1.08	82.84	1.38	82.54	0.94	82.98	0.98	82.94	1.21	82.71	0.62	83.30
FMP	Shallow	MW-15	2	12	NGVD29	89.89	88.735	2.85	85.89	2.79	85.95	2.75	85.99	3.25 (0.07)	85.58	1.75	86.99	2.24	86.50	3.17	85.57	1.7	87.04
FMP	Shallow	MW-16	2	12	NGVD29	89.97	88.815	2.92	85.90	3.04	85.78	2.86	85.96	3.29	85.53	1.94	86.88	2.6	86.22	3.01	85.81	2	86.82
FMP	Shallow	MW-17	5	15	NGVD29	89.03	87.875	5.53	82.35	5.59	82.29	5.55	82.33	5.54	82.34	4.98	82.90	5.42	82.46	5.45	82.43	--	--
FMP	Shallow	MW-18	5	15	NGVD29	90.54	89.385	8.96	80.43	9.15	80.24	9.31	80.08	8.86	80.53	8.6	80.79	9.15	80.24	9.1	80.29	8.67	80.72
FMP	Shallow	MW-21	4	14	NGVD29	90.67	89.515	6.46	83.06	6.37	83.15	6.44 (0.01)	83.12	7.24 (0.01)	82.32	5.88	83.68	5.43	84.09	8.01 (1.1)	82.43	5.24	84.28
FMP	Shallow	MW-23	7.07	17.07	NGVD29	93.65	92.495	13.21	79.29	13.45	79.05	13.79	78.71	14.44	78.06	11.53	80.97	13.32	79.18	14.6	77.90	12.02	80.48
FMP	Shallow	MW-24	8	18	NGVD29	102.61	101.455	11.30	90.16	10.96	90.50	10.99	90.47	11.61	89.85	9.64	91.82	10.27	91.19	11.71	89.75	10.34	91.12
FMP	Shallow	MW-25	11.56	21.56	NGVD29	106.09	104.935	15.47	89.47	12.94	92.04	14.86	90.08	15.69	89.25	13.63	91.31	13.95	90.99	16.1	88.84	14.45	90.49
FMP	Shallow	MW-26	10.2	20.2	NGVD29	99.74	98.585	13.11 (0.33)	85.78	12.45	86.14	12.46	86.13	13.17	85.42	11.04	87.55	11.51	87.08	14.4 (1.00)	85.03	11.89	86.70
FMP	Shallow	MW-27	11	21	NGVD29	100.71	99.555	13.79 (0.53)	86.23	12.94	86.62	12.93	86.63	13.69	85.87	11.4	88.16	11.97	87.59	15.04 (1.06)	85.40	12.31	87.25
FMP	Shallow	MW-38	5	15	NAVD88	86.77	86.77	8.36	78.41	9.67	77.10	9.98	76.79	10.29	76.48	7.56	79.21	9.7	77.07	10.31	76.46	7.74	79.03
FMP	Shallow	MW-SCAR	3	13	NAVD88	96.27	96.27	4.61	91.66	4.59	91.68	4.69	91.58	4.91	91.36	2.98	93.29	4.61	91.66	4.68	91.59	3.32	92.95
Seep	Shallow	H-1P			NGVD29	90.56	89.405	--	--	--	--	5.78	83.63	7.78 (0.03)	81.69	5.92	83.49	5.95	83.46	6.11	83.30	--	--

EHS Support consider it done

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)
								2/20/2013		5/20/2013		8/16/2013		11/20/2013		4/2/2014		6/23/2014		11/20/2014		3/12/2015	
Seep	Shallow	H-3P			NGVD29	89.9	88.745	--	--	--	--	6.97 (0.46)	82.19	7.15 (1.00)	82.44	6.68 (0.46)	82.48	6.66 (0.58)	82.59	6.99 (0.20)	81.96	--	--
Seep	Shallow	SVE-1	1	11	NGVD29	89.06	87.905	--	--	--	--	4.34	83.57	5.32	82.59	3.85	84.06	4.32	83.59	3.32	84.59	--	--
Seep	Shallow	SVE-2	1	11	NGVD29	90.38	89.225	--	--	--	--	6.47	82.76	7.43	81.79	5.5	83.73	6.2	83.02	5.32	83.91	--	--
Seep	Shallow	SVE-3	0.755	10.755	NGVD29	89.65	88.495	--	--	--	--	6.76	81.74	7.88	80.62	5.82	82.68	6.45	82.05	--	--	--	--
Seep	Shallow	SVE-4	8	18	NGVD29	94.48	93.325	--	--	--	--	9.67	83.66	10.37	82.96	8.75	84.58	9.05	84.28	10.16	83.17	--	--
Seep	Shallow	SVE-5	3.5	13.5	NGVD29	90.18	89.025	--	--	--	--	4.99 (0.01)	84.08	5.78 (0.02)	83.30	4.94	84.09	5.04	83.99	8.02 (2.02)	82.66	--	--
Seep	Shallow	SVE-6	5	15	NGVD29	90.88	89.725	--	--	--	--	6.1	83.67	6.74 (0.39)	83.34	5.32	84.41	5.53	84.20	6.99 (0.09)	82.85	--	--
Seep	Shallow	SVE-7	4	14	NGVD29	90.27	89.115	--	--	--	--	5.97 (0.02)	83.20	6.6	82.52	5.25	83.87	5.48	83.63	6.5	82.62	--	--
Seep	Shallow	SVE-8	4.5	14.5	NGVD29	88.95	87.795	--	--	--	--	5.09	82.71	5.64	82.16	4	83.80	4.67	83.13	5.77	82.03	--	--
Seep	Shallow	SVE-9	5	20	NGVD29	93.11	91.955	--	--	--	--	7.40	84.56	9.41	82.55	7.8	84.16	8.15	83.81	7.45	84.51	--	--
Seep	Shallow	SVE-10	5	20	NGVD29	93.36	92.205	--	--	--	--	9.40	82.81	10.02	82.19	8.35	83.86	8.74	83.47	10.19	82.02	--	--
Seep	Shallow	SVE-11	5	15	NGVD29	91.45	90.295	--	--	--	--	7.72	82.58	8.49	81.81	6.57	83.73	7.17	83.13	5.61	84.69	--	--
Seep	Shallow	SVE-12	4.5	14.5	NGVD29	91.37	90.215	--	--	--	--	7.87	82.35	8.75	81.47	6.68	83.54	7.35	82.87	6.05	84.17	--	--
Seep	Shallow	WP-1			NGVD29	93.34	92.185	--	--	--	--	7.96 (0.48)	84.65	8.52 (0.64)	84.22	7.66 (0.43)	84.91	7.2	84.99	8.73 (0.02)	83.51	--	--
Seep	Shallow	WP-7	13	18	NGVD29	104.64	103.485	--	--	--	--	16.34	87.15	17.12	86.37	15.1	88.39	15.35	88.14	17.52	85.97	--	--
Seep	Shallow	WP-8	5	10	NGVD29	97.25	96.095	--	--	--	--	8.49	87.61	--	--	6.66	89.44	5.4	90.70	--	--	--	--
Seep	Shallow	WP-14	1	6	NGVD29	87.44	86.285	--	--	--	--	2.02	84.27	2.94 (0.32)	83.64	1.94	84.35	2.16	84.13	1.86	84.43	--	--
Seep	Shallow	WP-17	1	6	NGVD29	84.84	83.685	--	--	--	--	3.49	80.20	3.7	79.99	3.47	80.22	3.47	80.22	3.6	80.09	--	--
Seep	Shallow	WP-18			NGVD29	92.40	91.245	--	--	--	--	4.86	86.39	--	--	3.72	87.53	4.48	86.77	5.58	85.67	--	--
Seep	Shallow	WP-20			NGVD29	91.35	90.195	--	--	--	--	7.50	82.70	8.17	82.02	6.78	83.42	7.94	82.26	8.12	82.07	--	--
Seep	Shallow	WP-21			NGVD29	90.59	89.435	--	--	--	--	6.62	82.82	--	--	5.58	83.86	7.78	81.66	6.63	82.81	--	--
Shallow-Intermediate Wells																							
FMP	Shallow-Intermediate	MW-1	5.83	25.83	NAVD88	105.67	105.67	17.57	88.51	17.05	89.03	16.97	89.11	17.76	88.32	15.68	90.40	15.75	89.92	17.89	87.78	16.21	89.46
FMP	Shallow-Intermediate	MW-28	16.79	31.79	NAVD88	114.85	114.85	23.81	91.04	23.16	91.69	23.19	91.66	23.90	90.95	22.00	92.85	22.08	92.77	24.25	90.60	22.73	92.12
FMP	Shallow-Intermediate	MW-29	9.00	24.00	NGVD29	100.73	99.575	14.57	85.01	14.17	85.41	14.25	85.33	14.93	84.65	12.53	87.05	13.33	86.25	15.45	84.13	13.42	86.16

Notes:

Data point is suspect and was not used interpolations.

Well exhibited a product thickness of >0.1 feet at the time of gauging. All data were corrected for any product thickness using an LNAPL density of 0.8 g/mL but only product thickness >0.1 feet are highlighted here.

Artesian condition observed and the TOC elevation used in interpolation.

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

ft BTIC = feet below top of inner casing

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Maximum Groundwater Elevation (2010-2017)	Minimum Groundwater Elevation (2010-2017)
								6/24/2015		11/13/2015		3/24/2016		10/31/2016		8/18/2017		10/9/2017			
Shallow Wells																					
Burn	Shallow	BSMW0001	3	13	NAVD88	83.25	83.25	5.98	77.27	5.95	77.30	5.14	78.11	6.39	76.86	6.46	76.79	--	--	79.36	76.45
Burn	Shallow	BSMW0002	3	13	NAVD88	82.05	82.05	6.21	75.84	5.44	76.61	5.32	76.73	6.01	76.04	6.22	75.83	--	--	76.73	75.39
Burn	Shallow	BSMW0003	2	12	NAVD88	79.39	79.39	3.38	76.01	2.54	76.85	2.34	77.05	3.13	76.26	3.32	76.07	--	--	77.05	75.52
Burn	Shallow	BSMW0004	3	13	NAVD88	82.22	82.22	6.72	75.50	6.55	75.67	6.32	75.90	6.84	75.38	6.97	75.25	--	--	76.01	75.04
Burn	Shallow	BSMW0005	2	12	NAVD88	83.67	83.67	5.67	78.00	5.21	78.46	--	--	--	--	--	--	--	--	78.72	76.10
Burn	Shallow	BSMW0006	2	12	NAVD88	86.22	86.22	3.96	82.26	4.92	81.30	--	--	--	--	--	--	--	--	83.30	79.80
Burn	Shallow	BSMW0007	2	12	NAVD88	84.08	84.08	4.9	79.18	4.89	79.19	--	--	--	--	--	--	--	--	79.74	78.35
Burn	Shallow	MW-7	5	15	NAVD88	81.29	81.29	4.01	77.28	3.87	77.42	--	--	--	--	--	--	--	--	78.26	76.39
Burn	Shallow	MW-8	5	15	NAVD88	84.24	84.24	4.52	79.72	5.32	78.92	--	--	--	--	--	--	--	--	81.09	77.89
Burn	Shallow	MW-9	10	20	NAVD88	87.46	87.46	8.95	78.51	8.12	79.34	--	--	--	--	--	--	--	--	80.66	78.51
Burn	Shallow	MW-10	5	15	NAVD88	88.17	88.17	4.98	83.19	5.53	82.64	--	--	--	--	--	--	--	--	84.54	81.76
Burn	Shallow	MW-40A	5	15	NAVD88	83.41	83.41	7.42	75.99	7.53	75.88	6.88	76.53	7.92	75.49	7.93	75.48	--	--	76.92	75.28
Burn	Shallow	RRMW0001	2	12	NAVD88	79.71	79.71	4.16	75.55	4.25	75.46	--	--	--	--	--	--	--	--	76.05	75.03
Burn	Shallow	RRMW0002	2	12	NAVD88	79.54	79.54	4.32	75.22	4.45	75.09	--	--	--	--	--	--	--	--	75.62	74.80
FMP	Shallow	MPMW0001	3.5	13.5	NAVD88	87.51	87.51	4.47	83.04	4.8	82.71	4.75	82.76	5.03	82.48	4.85	82.66	--	--	83.33	82.42
FMP	Shallow	MPMW0005	9	19	NAVD88	103.15	103.15	12.26	90.89	13.17	89.98	11.97	91.18	13.29	89.86	12.07	91.08	--	--	92.58	89.86
FMP	Shallow	MPMW0008	12	22	NAVD88	98.36	98.36	15.33	83.03	16.05	82.31	14.82	83.54	16.62	81.74	16.37	81.99	16.57	81.79	84.64	81.74
FMP	Shallow	MPMW0009	2	12	NAVD88	85.86	85.86	1.11	84.75	1.74	84.12	1.23	84.63	1.90	83.96	1.87	83.99	1.77	84.09	85.36	83.96
FMP	Shallow	MPMW0011	5	15	NAVD88	86.61	86.61	3.15	83.46	4.7	81.91	3.17	83.44	3.90	82.71	3.69	82.92	--	--	84.11	81.91
FMP	Shallow	MPMW0017	2	12	NAVD88	87.92	87.92	--	--	3.31	84.61	2.35	85.57	3.52	84.40	2.95	84.97	--	--	85.57	84.40
FMP	Shallow	MPMW0024	6.5	16.5	NAVD88	89.92	89.92	--	--	11.21	78.71	9.47	80.45	11.53	78.39	11.42	78.50	--	--	80.45	78.39
FMP	Shallow	MPMW0027	4.5	14.5	NAVD88	87.42	87.42	--	--	8.41	79.01	6.63	80.79	8.93	78.49	8.53	78.89	--	--	80.79	78.49
FMP	Shallow	MPMW0030	2	12	NAVD88	79.08	79.08	--	--	4.44	74.64	4.42	74.66	4.65	74.43	4.73	74.35	--	--	74.66	74.35
FMP	Shallow	MPMW0032	3	13	NAVD88	88.05	88.05	--	--	3.56	84.49	2.71	85.34	3.74	84.31	3.41	84.64	--	--	85.34	84.31
FMP	Shallow	MPMW0034	5	15	NAVD88	91.47	91.47	--	--	--	--	--	--	--	--	13.81	77.66	--	--	--	--
FMP	Shallow	MPMW0044	4	14	NAVD88	85.84	85.84	--	--	--	--	--	--	--	--	7.20	78.64	--	--	--	--
FMP	Shallow	MPMW0046	5	15	NAVD88	86.56	86.56	--	--	--	--	--	--	--	--	8.28	78.28	--	--	--	--
FMP	Shallow	MPMW0049	5	15	NAVD88	89.10	89.10	--	--	--	--	--	--	--	--	2.65	86.45	--	--	--	--
FMP	Shallow	MW-2	5	15	NGVD29	86.79	85.635	6.83	78.81	7.56	78.08	5.85	79.79	8.06	77.58	7.75	77.89	--	--	81.16	77.51
FMP	Shallow	MW-3	10	20	NGVD29	91.04	89.885	7.28	82.61	9.36	80.53	7.39	82.50	9.52	80.37	9.25	80.64	9.46	80.43	83.59	80.27
FMP	Shallow	MW-4	9.4	19.4	NAVD88	88.41	88.41	9.17	79.24	10.02	78.39	8.05	80.36	10.26	78.15	9.89	78.52	--	--	84.07	78.15
FMP	Shallow	MW-6	5	9	NGVD29	86.99	85.835	3.93	81.91	4.25	81.59	3.28	82.56	5.23	80.61	5.19	80.65	5.43	80.41	83.36	80.41
FMP	Shallow	MW-11	5.73	15.73	NAVD88	97.25	97.25	9.58	87.67	11.86 (1.25)	86.39	10.65	86.60	10.47	86.78	10.62 (0.02)	86.65	10.71 (0.79)	86.54	88.70	85.89
FMP	Shallow	MW-12	6	16	NGVD29	97.54	96.385	8.11	88.28	9.35	87.04	7.99	88.40	9.13 (0.07)	87.26	8.69	87.70	--	--	89.15	86.94
FMP	Shallow	MW-13R	2.25	12.25	NAVD88	89.63	89.63	5.87	83.76	6.55	83.08	5.85	83.78	6.63	83.00	6.35	83.28	6.55 (0.01)	83.08	84.23	82.99
FMP	Shallow	MW-14	1	11	NGVD29	85.07	83.915	1.03	82.89	1.31	82.61	0.81	83.11	1.48	82.44	1.45	94.07	--	--	94.07	82.44
FMP	Shallow	MW-15	2	12	NGVD29	89.89	88.735	2.51	86.23	3.32	85.42	2.37	86.37	3.36	85.42	3.10	85.64	--	--	87.04	85.32
FMP	Shallow	MW-16	2	12	NGVD29	89.97	88.815	2.66	86.16	3.22	85.60	2.71	86.11	3.42	85.40	3.03	85.79	--	--	86.88	85.37
FMP	Shallow	MW-17	5	15	NGVD29	89.03	87.875	5.48	82.40	5.51	82.37	5.37	82.51	5.63	82.25	5.58	82.30	--	--	83.10	81.94
FMP	Shallow	MW-18	5	15	NGVD29	90.54	89.385	8.73	80.66	9.07	80.32	9.1	80.29	9.08	80.31	9.18	80.21	--	--	81.58	80.08
FMP	Shallow	MW-21	4	14	NGVD29	90.67	89.515	5.94	83.58	7.93 (0.83)	82.29	5.6	83.92	7.52 (0.16)	82.16	7.03	82.49	--	--	84.28	81.68
FMP	Shallow	MW-23	7.07	17.07	NGVD29	93.65	92.495	14.31	78.19	14.75	77.75	12.79	79.71	14.97	77.53	14.62	77.88	--	--	80.97	77.53
FMP	Shallow	MW-24	8	18	NGVD29	102.61	101.455	10.81	90.65	11.81	89.65	10.67	90.79	11.9	89.56	11.65	89.81	--	--	91.82	86.96
FMP	Shallow	MW-25	11.56	21.56	NGVD29	106.09	104.935	14.72	90.22	16.21	88.73	14.62	90.32	16.08	88.86	15.71	89.23	--	--	92.04	88.58
FMP	Shallow	MW-26	10.2	20.2	NGVD29	99.74	98.585	12.29	86.30	14.05 (0.48)	84.96	12.03	86.56	13.51	85.12	13.24	85.35	13.52 (0.02)	85.09	87.55	84.05
FMP	Shallow	MW-27	11	21	NGVD29	100.71	99.555	12.81	86.75	15.01 (0.90)	85.31	12.49	87.07	13.97	85.59	13.76	85.80	--	--	88.16	85.24
FMP	Shallow	MW-38	5	15	NAVD88	86.77	86.77	9.94	76.83	10.46	76.31	10.19	76.58	10.66	76.11	10.55	76.22	--	--	79.21	76.09
FMP	Shallow	MW-SCAR	3	13	NAVD88	96.27	96.27	4.71	91.56	4.96	91.31	4.31	91.96	5.36	90.91	5.34	90.93	5.46	90.81	93.29	90.81
Seep	Shallow	H-1P			NGVD29	90.56	89.405	--	--	--	--	6.02	83.39	--	--	6.39	83.02	--	--	83.63	81.69

EHS Support consider it done

Table 5-6
Historical Groundwater Elevations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Site	Water Bearing Zone	Well ID	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	TIC Datum	TIC (Weston's original)	TIC NAVD88	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Depth to Groundwater (ft BTIC)	Groundwater Elevation (ft amsl)	Maximum Groundwater Elevation (2010-2017)	Minimum Groundwater Elevation (2010-2017)
								6/24/2015		11/13/2015		3/24/2016		10/31/2016		8/18/2017		10/9/2017			
Seep	Shallow	H-3P			NGVD29	89.9	88.745	--	--	--	--	6.71 (0.28)	82.30	--	--	6.75	82.00	--	--	82.59	81.88
Seep	Shallow	SVE-1	1	11	NGVD29	89.06	87.905	--	--	--	--	4.86	83.05	--	--	4.84	83.07	--	--	84.59	82.59
Seep	Shallow	SVE-2	1	11	NGVD29	90.38	89.225	--	--	--	--	6.05	83.18	--	--	7.46	81.765	--	--	83.91	81.60
Seep	Shallow	SVE-3	0.755	10.755	NGVD29	89.65	88.495	--	--	--	--	--	--	--	--	5.72	82.775	--	--	82.78	80.47
Seep	Shallow	SVE-4	8	18	NGVD29	94.48	93.325	--	--	--	--	9.36	83.97	--	--	10.35	82.975	--	--	84.58	82.72
Seep	Shallow	SVE-5	3.5	13.5	NGVD29	90.18	89.025	--	--	--	--	6.16 (0.02)	82.92	--	--	5.75	83.275	--	--	84.09	82.58
Seep	Shallow	SVE-6	5	15	NGVD29	90.88	89.725	--	--	--	--	5.8 (0.03)	83.99	--	--	6.66	83.065	--	--	84.41	82.62
Seep	Shallow	SVE-7	4	14	NGVD29	90.27	89.115	--	--	--	--	5.69	83.43	--	--	6.50	82.615	--	--	83.87	82.40
Seep	Shallow	SVE-8	4.5	14.5	NGVD29	88.95	87.795	--	--	--	--	4.79	83.01	--	--	5.68	82.115	--	--	83.80	81.92
Seep	Shallow	SVE-9	5	20	NGVD29	93.11	91.955	--	--	--	--	8.35	83.61	--	--	4.36	87.595	--	--	87.60	82.35
Seep	Shallow	SVE-10	5	20	NGVD29	93.36	92.205	--	--	--	--	8.94	83.27	--	--	10.00	82.205	--	--	83.86	81.94
Seep	Shallow	SVE-11	5	15	NGVD29	91.45	90.295	--	--	--	--	6.25	84.05	--	--	8.54	81.755	--	--	84.69	81.52
Seep	Shallow	SVE-12	4.5	14.5	NGVD29	91.37	90.215	--	--	--	--	7.34	82.88	--	--	8.82	81.395	--	--	84.17	81.03
Seep	Shallow	WP-1			NGVD29	93.34	92.185	--	--	--	--	7.31	84.88	--	--	--	--	--	--	84.99	83.51
Seep	Shallow	WP-7	13	18	NGVD29	104.64	103.485	--	--	--	--	15.92	87.57	--	--	17.07	86.42	--	--	88.39	85.97
Seep	Shallow	WP-8	5	10	NGVD29	97.25	96.095	--	--	--	--	8.61	87.49	--	--	9.15	86.95	--	--	90.70	86.95
Seep	Shallow	WP-14	1	6	NGVD29	87.44	86.285	--	--	--	--	2.15	84.13	--	--	--	--	--	--	84.80	83.46
Seep	Shallow	WP-17	1	6	NGVD29	84.84	83.685	--	--	--	--	3.62	80.07	--	--	3.40	80.29	--	--	80.29	79.99
Seep	Shallow	WP-18			NGVD29	92.40	91.245	--	--	--	--	4.47	86.78	--	--	--	--	--	--	87.53	85.67
Seep	Shallow	WP-20			NGVD29	91.35	90.195	--	--	--	--	6.8	83.40	--	--	8.13	82.07	--	--	83.42	81.60
Seep	Shallow	WP-21			NGVD29	90.59	89.435	--	--	--	--	6.75	82.69	--	--	7.27	82.17	--	--	83.86	81.66
Shallow-Intermediate Wells																					
FMP	Shallow-Intermediate	MW-1	5.83	25.83	NAVD88	105.67	105.67	16.51	89.16	18.03	87.64	16.22	89.45	17.69	87.98	17.44	88.23	17.72	87.95	90.40	87.64
FMP	Shallow-Intermediate	MW-28	16.79	31.79	NAVD88	114.85	114.85	22.91	91.94	24.43	90.42	22.93	91.92	24.37	90.48	23.98	90.87	24.50	90.35	92.85	90.32
FMP	Shallow-Intermediate	MW-29	9.00	24.00	NGVD29	100.73	99.575	14.12	85.46	15.52	84.06	13.77	85.81	15.44	84.14	15.14	84.435	--	--	87.05	83.97

Notes:

Data point is suspect and was not used interpolations.

Well exhibited a product thickness of >0.1 feet at the time of gauging. All data were corrected for any product thickness using an LNAPL density of 0.8 g/mL but only product thickness >0.1 feet are highlighted here.

Artesian condition observed and the TOC elevation used in interpolation.

ft bgs = feet below ground surface

ft amsl = feet above mean sea level

ft BTIC = feet below top of inner casing

Table 5-7
Summary of Groundwater Seepage Velocity
The Sherwin-Williams Company
Gibbsboro, New Jersey

Shallow Seepage Velocity Estimate	Parameter	Units	Area of Site (MW-12 to MW-38)		
			MW-12	**MW-38**	**Shallow FMP Site Geometric Mean**
	K	ft/day	1.235	0.168	2.471
	dh/dl	ft/ft	0.010	0.010	0.010
Range	*v*	**ft/day**	**0.041**	**0.006**	**0.082**

NOTES:

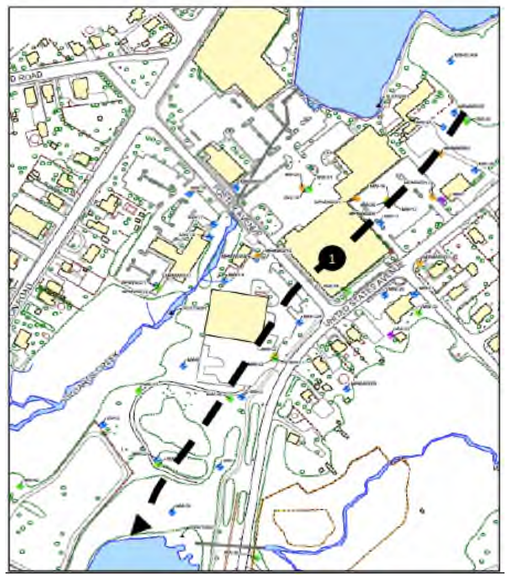
v = seepage velocity

K = hydraulic conductivity (calculated by Bouwer & Rice Method)

n = porosity = 0.3

dh/dl = horizontal hydraulic gradient (calculated for November 20, 2013)

$$v = \frac{K\,(dh)}{n\,(dl)}$$



Shallow, MW-12 to MW-38: The horizontal gradient calculated parallel to shallow groundwater flow path sitewide through the Former Manufacturing Plant using MW-12 and MW-38 locations and water elevations. Range of seepage velocities calculated using individual K arithmetic mean values for MW-12 and MW-38 (see Table 7A), and the geometric mean of shallow FMP Site wells (general flow path shown as dashed arrow No. 1 on inset). Within 100 feet of surface water bodies the seepage velocity increase is expected to increase to approximately 0.020 to 0.428 ft/day.

Intermediate, MPMW0014 to MW-22: The horizontal gradient calculated parallel to intermediate groundwater flow path through the Former Manufacturing Plant using MPMW0014 and MW-22 locations and water elevations. Range of seepage velocities calculated using individual K arithmetic mean values for MPMW0014 and MW-22 (see Table 7B), and the geometric mean of intermediate FMP Site wells (general flow path shown as dashed arrow No. 1 on inset).

Deep, MW-34 to MW-39: The horizontal gradient calculated parallel to deep groundwater flow path through the Former Manufacturing Plant using MW-34 and MW-39 locations and water elevations. Range of seepage velocities calculated using individual K arithmetic mean values for MW-34 and MW-39 (see Table 7C), and the geometric mean of deep FMP Site wells (general flow path shown as dashed arrow No. 1 on inset).

Table from Weston Solutions Former Manugfacturing Plant Groundwater Technical Memorandum, 2014.

Table 6-1
NAPL Physical Properties Data
The Sherwin-Williams Company
Gibbsboro, New Jersey

Well ID	Matrix	Temperature (°F) (°C)	Specific Gravity	Density (g/cc)	Viscosity		Initial Boiling Point (°F)
					centistokes	centipoise	
H-3P	NAPL	70°F	0.942	0.94	1.451	1.36	240
		100°F	0.933	0.926	1.132	1.05	
		130°F	0.927	0.914	0.939	0.858	
MW-11	NAPL	70°F	0.7939	0.7923	1.3809	1.094	275
		100°F	0.7789	0.7789	1.0776	0.8393	
		130°F	0.7664	0.7664	0.8968	0.6873	

Notes:
°F = degrees Fahrenheit
°C = degrees Celsius
g = grams
cc = cubic centimeter
NAPL = Non-aqueous phase liquid
N/A = not available

Table 6-2
Summary of LNAPL Physical and Chemical Characteristics (1993 - 2013)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample Site	Study Area	Area of Former Manufacturing Plant	Sample Point	Sample ID	Collection Date	Laboratory Analysis										
						API Gravity	Specific Gravity	Average Specific Gravity	Density[e] (g/mL)	Vapor Pressure[g] (mmHg)	Kinematic Viscosity[i] (cSt)	(SUS)	Interfacial Tension (dynes/cm)	Surficial Tension (dynes/cm)	Solubility[n] (mg/L)	Henry's Law Constant[p] ($Pa\text{-}m^3/mol$)
Hilliards Creek	Former Manufacturing Plant	Seep Area	Wet Well	PROD-041713	4/17/2013	50.58 [a]	0.7771 [c]		0.7726	< 0.001	0.85	29.4	27.0 [j]	22.5 [l]		
			H-3P	H-3P-083111 - Product (460-30602-1)	8/31/2011	45.06 [a]	0.8014 [c]	0.8012	--	7.86	1.15	--	19.3 [j]	28.0 [l]	10.8	1.79E+05
				PROD - 100211	10/5/2011	45.18 [a]	0.8009 [c]		--	6.256	1.13	--	26.4 [j]	26.8 [l]	4.4	2.20E+05
			MW-13	013-MP03	8/6/1993	--	0.701 [e]	0.7305	--	--	--	--	--	--	--	--
				013-M005P	7/14/1995	--	0.76 [f]		--	--	--	--	--	--	--	--
			MW-21	021-MP005P	7/14/1995	--	0.663 [f]	0.7612	--	--	--	--	--	--	--	--
				MW-21 (TOP)	12/16/2009	42.81 [b]	0.8118 [d]		0.811	--	--	--	--	--	--	--
				MW-21 (BOTTOM)	12/16/2009	9.79 [b]	1.0015 [d]		1.0005	--	0.707	28.06	19.1 [k]	51.1 [m]	--	--
				MW-21-GW-AY-R2-0	8/17/2010	43.47 [b]	0.8087 [d]		0.8079	--	1.146	29.64	--	--	--	--
		Former Tank Farm A	MW-1	MW-1 (Light / Upper Phase Only)	12/17/2009	42.96 [b]	0.8111 [d]	0.8111	0.8102	--	1.059	29.32	--	--	--	--
				MW-1-GW-BQ-R2-0	8/16/2010	9.98 [b]	1.0002 [d]		0.9992	--	0.676	27.95	--	--	--	--
			MW-11	011-MP03	8/6/1993	--	0.98 [e]	0.8221	--	--	--	--	--	--	--	--
				011-M005P	7/14/1995	--	0.688 [f]		--	--	--	--	--	--	--	--
				MW-11	12/16/2009	46.41 [b]	0.7953 [d]		0.7945	--	1.005	29.14	28.7 [k]	27.9 [m]	--	--
				MW-11-GW-BA-R2-0 (PRODUCT)	8/16/2010	46.43 [b]	0.7953 [d]		0.7945	--	1.055	29.31	--	--	--	--
				MW-11-GW-BA-R2-0 (AQUEOUS)	8/16/2010	34.61 [b]	0.8518 [d]		0.8510	--	0.696	28.02	--	--	--	--
			MW-30	MW-30-GW-EL-R3-0	8/16/2010	9.75 [b]	1.0017 [d]		1.0008	--	0.691	28.01	--	70.9 [m]	--	--
		Former Service Station/Tavern	MW-26	026-M005P	7/15/1995	--	0.761 [f]	0.7610	--	--	--	--	--	--	--	--

Notes:

[a] API Gravity of Petroleum Products, Hydrometer Method, ASTM D 1298, @ 60°F
[b] API Gravity, ASTM D 4052, @ 60°F
[c] Specific Gravity calculated by: Specific Gravity = 141.5/(API Gravity +131.5)
[d] Specific Gravity, ASTM D 4052, @ 60/60°F
[e] Specific Gravity , ASTM 1298, @ 60°F
[f] Specific Gravity, Standard Methods for the Examination of Waste and Wastewater, Method 213 E
[g] Density, ASTM D 4052, @ 60°F
[h] Vapor Pressure by isoteniscope, ASTM D 2879, @ 100°F
[i] Viscosity, Kinematic, ASTM D 445, @ 40°C (104°F)
[j] Interfacial Tension of Oil against Water by the Ring Method, ASTM D 971, @ 25°C
[k] Interfacial Tension, ASTM D 1331-B, @ 73°F (22.8°C)
[l] Surface Tension of Oil against Water by the Ring Method, ASTM D 971, @ 25°C
[m] Surface Tension, ASTM D 1331-A, @ 70°F (21.1°C)
[n] Solubility in Water, ASTM E 1148, @ 25°C
[p] Henry's Law Constant (calculated)
-- Not analyzed/no data
cSt: centistokes
SUS: Saybolt Universal Units

Table 6-3
LNAPL Composition
The Sherwin-Williams Comany
Gibbsboro, New Jersey

Sample Location ID	H-3P		H-3P		MW-11	
Constituent	**10/5/2011**		**8/22/2017**		**8/22/2017**	
EXTRACTABLE PETROLEUM HYDROCARBONS (EPH)	**mg/kg**	**% of total**	**mg/kg**	**% of total**	**mg/kg**	**% of total**
C9-C12 Petroleum Hydrocarbons, Aliphatic	1400000	69.6%	790000	57.1%	770000	62.9%
C12-C16 Petroleum Hydrocarbons, Aliphatic	--	--	89000	6.4%	94000	7.7%
C16-C21 Petroleum Hydrocarbons, Aliphatic	--	--	38000	2.7%	39000	3.2%
Diesel Range Organics (C21-C40 Aliphatics)	360000	17.9%	63000	4.6%	62000	5.1%
C10-C12 Aromatics	130000	6.5%	25000	1.8%	30000	2.5%
C12-C16 Aromatics	6000	0.3%	5100	0.4%	6000	0.5%
C16-C21 Aromatics	14000	0.7%	1900	0.1%	1900	0.2%
C21-C36 Aromatic	67000	3.3%	3100	0.2%	5500	0.4%
Total EPH Proportion		**98.2%**		**73.4%**		**82.4%**
VOLATILE PETROLEUM HYDROCARBONS (VPH)						
C5-C8 Petroleum Hydrocarbons, Aliphatic	--	--	49000	3.5%	33000	2.7%
C9-C10 Petroleum Hydrocarbons, Aromatic	--	--	120000	8.7%	35000	2.9%
C9-C12 Petroleum Hydrocarbons, Aliphatic	--	--	250000	--	73000	--
Total VPH Proportion (Excluding C9-C12)		**--**		**12.2%**		**5.6%**
Total Aliphatic Proportion (VPH and EPH)[1]		**87.4%**		**74.4%**		**81.5%**
Total Aromatic Proportion (VPH and EPH)		**10.8%**		**11.2%**		**3.5%**
SEMIVOLATILE ORGANIC COMPOUNDS (TICs)						
1,2,4,5-Tetramethylbenzene	--	--	6100	0.4%	5300	0.4%
1,3-Diethyl Benzene	--	--	--	--	4900	0.4%
1,3-Diethyl-5-Methylbenzene	--	--	5400	0.4%	--	--
Cis-1,3-Dimethyl Cyclohexane	--	--	--	--	5800	0.5%
Cis-Decahydronaphthalene	--	--	--	--	7700	0.6%
Cyclopentane, 1,2,4-Trimethyl- (1.Alpha	--	--	--	--	4900	0.4%
Decahydro Naphthalene	--	--	4300	0.3%	--	--
M-Xylene (1,3-Dimethylbenzene)	--	--	6600	0.5%	--	--
O-Cymene (O-Isopropyltoluene)	--	--	4400	0.3%	8300	0.7%
Unknown	--	--	--	--	7000	0.6%
Unknown	--	--	3800	0.3%	6800	0.6%
Unknown	--	--	5400	0.4%	7500	0.6%
Unknown	--	--	--	--	4700	0.4%
Unknown	--	--	4200	0.3%	--	--
Unknown	--	--	--	--	6600	0.5%
Unknown	--	--	--	--	4500	0.4%
Unknown	--	--	--	--	7100	0.6%
Unknown	--	--	5800	0.4%	--	--
Unknown	--	--	11000	0.8%	9900	0.8%
Unknown	--	--	--	--	6100	0.5%
Unknown	--	--	9400	0.7%	--	--
Unknown	--	--	3300	0.2%	--	--
Unknown	--	--	3700	0.3%	--	--
Unknown	--	--	3500	0.3%	--	--
Unknown	--	--	--	--	5600	0.5%
Unknown	--	--	6800	0.5%	--	--
Unknown	--	--	3200	0.2%	--	--
Unknown	--	--	2900	0.2%	--	--
Unknown	--	--	3100	0.2%	--	--
Unknown TIC	--	--	3100	0.2%	4800	0.4%
Unknown TIC	--	--	3100	0.2%	5700	0.5%
Unknown TIC	--	--	--	--	4400	0.4%
Unknown TIC	--	--	--	--	6700	0.5%
Total SVOC TIC Mass Fraction		**--**		**7%**		**10%**

Table 6-3
LNAPL Composition
The Sherwin-Williams Comany
Gibbsboro, New Jersey

Sample Location ID	H-3P		H-3P		MW-11	
Constituent	10/5/2011		8/22/2017		8/22/2017	
SEMIVOLATILE ORGANIC COMPOUNDS						
1,1'-Biphenyl	--	--	--	--	--	--
2,4-Dimethylphenol	--	--	--	--	--	--
2-Methylnaphthalene	--	--	360	0.0%	130	0.0%
4-Chloroaniline	--	--	--	--	--	--
4-Methylphenol	1600	0.1%	--	--	--	--
Acenaphthene	--	--	--	--	--	--
Acenaphthylene	--	--	--	--	--	--
Anthracene	--	--	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	--
Benzo(a)pyrene	--	--	--	--	--	--
Benzo(b)fluoranthene	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	--	--	--	--	--
Benzo(k)fluoranthene	--	--	--	--	--	--
Chrysene	--	--	--	--	--	--
Diethylphthalate	--	--	--	--	--	--
Fluoranthene	--	--	--	--	--	--
Fluorene	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--
Naphthalene	1600	0.1%	1500	0.1%	50	0.0%
Phenanthrene	1600	0.2%	--	--	--	--
Phenol	--	--	--	--	--	--
Pyrene	--	--	--	--	--	--
BIS(2-Ethylhexyl) Phthalate	--	--	--	--	--	--
Total SVOC Mass Fraction		**0.1%**		**0.1%**		**0.0%**
VOLATILE ORGANIC COMPOUNDS (TICs)						
1,2,3-Trimethyl Benzene	--	--	4900	0.4%	--	--
1,2,4,5-Tetramethylbenzene	--	--	5000	0.4%	--	--
1,2,4-Trimethylbenzene	--	--	9500	0.7%	--	--
1,2-Diethylbenzene	870	0.0%	--	--	870	0.1%
1,3,5-Trimethylbenzene (Mesitylene)	--	--	7500	0.5%	--	--
1,3-Cyclopentadiene, 1,2,3,4-Tetramethyl-5-Methylene	980	0.0%	--	--	980	0.1%
1,4-Diethyl Benzene	--	--	6900	0.5%	--	--
1,4-Dimethylcyclohexane	1300	0.1%	--	--	1300	0.1%
2-Ethyl-1,4-Dimethyl Benzene	--	--	7700	0.6%	--	--
4-Ethyl-1,2-Dimethyl Benzene	990	0.0%	--	--	990	0.1%
Cis-1,3-Dimethyl Cyclohexane	9500	0.5%	5500	0.4%	9500	0.8%
Decahydro Naphthalene	1300	0.1%	--	--	1300	0.1%
Ethyl Cyclohexane	1100	0.1%	--	--	1100	0.1%
Ethylmethyl Cyclohexane	1900	0.1%	--	--	1900	0.2%
M-Cymene	--	--	12000	0.9%	--	--
Trans-1,2-Dimethylcyclohexane	990	0.0%	--	--	990	0.1%
Unknown Aromatic	1000	0.0%	6500	0.5%	1000	0.1%
Unknown Cycloalkane	--	--	6200	0.4%	--	--
Total VOC TIC Mass Fraction		**1.0%**		**5.2%**		**1.6%**
VOLATILE ORGANIC COMPOUNDS						
1,1-Dichloroethene	--	--	--	--	--	--
4-Methyl-2-Pentanone	--	--	--	--	--	--
Acetone	--	--	--	--	--	--
Benzene	91	0.0%	100	0.01%	5	0.0%
Carbon Disulfide	--	--	--	--	--	--
Chlorobenzene	--	--	--	--	--	--
CIS-1,2-Dichloroethene	--	--	--	--	--	--
Cyclohexane	--	--	140	0.0%	130	0.0%
Dichloromethane	--	--	--	--	--	--
Ethylbenzene	2100	0.1%	4400	0.3%	10	0.0%
Isopropylbenzene (Cumene)	--	--	660	0.0%	260	0.0%
M,P-Xylene	--	--	19000	1.4%	3	0.0%
Methylcyclohexane	--	--	2100	0.2%	2800	0.2%

Table 6-3
LNAPL Composition
The Sherwin-Williams Comany
Gibbsboro, New Jersey

Sample Location ID	**H-3P**		**H-3P**		**MW-11**	
Constituent	**10/5/2011**		**8/22/2017**		**8/22/2017**	
Methyl-Tert-Butyl-Ether (MTBE)	--	--	--	--	--	--
O-Xylene (1,2-Dimethylbenzene)	--	--	50	0.0%	4	0.0%
Toluene	5	0.0%	15	0.0%	10	0.0%
Trichloroethene	--	--	--	--	--	--
Vinyl Chloride	--	--	--	--	--	--
Xylenes, Total	8800	0.9%	--	--	--	--
Total VOC Mass Fraction		**1.0%**		**1.9%**		**0.3%**
Sum of Total Detected Constituents[1]	**2012726**		**1383225**		**1224031**	

Note:

[1] C9-C12 Aliphatics by VPH methods was excluded in the sum of total detecgted constituents to avoid double counting as C9-C12 aliphatics was also quantified via EPH methods.

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-13	MW-13	MW-21	MW-21	MW-21	H-3P (mg/Kg)	H-3P (µg/l)	H-3P (mg/Kg)	H-3P (µg/l)	MW-11	MW-11	MW-11	MW-1	MW-1	MW-11
Field Sample ID	013-MP03	013-M005P	021-M005P	MW-21-GW-AU-R1-0	MW-21-GW-AY-R2-0	H3P-PR-AI-R1-0	H3P-PR-AI-R1-0	H3P-PR-AI-R2-0	H3P-PR-AI-R2-0	011-MP03	011-M005P	MW-11-GW-AZ-R1-0	MW-1-GW-BQ-R1-0	MW-1-GW-BQ-R2-0	MW-11-GW-BA-R2-0
Date Collected	08/06/1993	07/14/1995	07/14/1995	12/16/2009	08/17/2010	9/30/2014	9/30/2014	10/23/2014	10/23/2014	08/06/1993	07/14/1995	12/16/2009	12/17/2009	08/16/2010	08/16/2010
FMP Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A
INORGANICS															
% ASH (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
% SULFUR (%)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ALKALINITY (mg/l)	NA	NA	NA	**474**	**676**	NA	NA	NA	NA	NA	NA	**184**	**113**	**200**	**370**
ALKALINITY, BICARBONATE (mg/l)	NA	NA	NA	**474**	**676**	NA	NA	NA	NA	NA	NA	**184**	**113**	**200**	**370**
ALKALINITY, CARBONATE (mg/l)	NA	NA	NA	5 U	5 U	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	5 U
AMMONIA, AS N (mg/l)	NA	NA	NA	**6.9**	**12.4**	NA	NA	NA	NA	NA	NA	**2.7**	**0.11**	**0.083 J**	**5.3**
CARBON DIOXIDE FREE (mg/l)	NA	NA	NA	**123 J**	**693 J**	NA	NA	NA	NA	NA	NA	**120 J**	**75.1 J**	**88 J**	**210 J**
CHLORIDE (mg/l)	NA	NA	NA	**736 J**	**1160 J**	NA	NA	NA	NA	NA	NA	**488 J**	5 UJ	**6.1 J**	**1500 J**
CYANIDE, REACTIVE (mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHANE (µg/l)	NA	NA	NA	50 U	100 U	NA	NA	NA	NA	NA	NA	50 U	100 U	500 U	250 U
ETHENE (µg/l)	NA	NA	NA	50 U	93 U	NA	NA	NA	NA	NA	NA	50 U	100 U	470 U	230 U
FERRIC IRON (mg/l)	NA	NA	NA	**55.7 J**	**0.2**	NA	NA	NA	NA	NA	NA	**67 J**	**83.6**	**31**	**6**
FERROUS IRON (mg/l)	NA	NA	NA	**0.82 J**	**43**	NA	NA	NA	NA	NA	NA	**2.8 J**	**13.5 J**	**46**	**94**
GRAVITY (µg/l)	**0.76**	**0.701**	**0.663**	NA	NA	NA	NA	NA	NA	**0.98**	**0.688**	NA	NA	NA	NA
HARDNESS AS CALCIUM CARBONATE (mg/l)	NA	NA	NA	**574**	**650**	NA	NA	NA	NA	NA	NA	**261**	**99**	**70**	**380**
IGNITABILITY (deg f)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHANE (µg/l)	NA	NA	NA	**4300**	**3200**	NA	NA	NA	NA	NA	NA	**6500**	**11000**	**14000**	**9900**
NITRATE (mg/l)	NA	NA	NA	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	0.1 U	**R**	0.1 U	0.1 U
PH (su)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PHOSPHORUS (mg/l)	NA	NA	NA	**0.066**	0.082 U	NA	NA	NA	NA	NA	NA	**0.056**	**0.017 J**	**0.021 J**	**0.21**
SULFATE (mg/l)	NA	NA	NA	5 U	5 UJ	NA	NA	NA	NA	NA	NA	5 U	5 U	5 UJ	5 UJ
SULFIDE (mg/l)	NA	NA	NA	**3**	1 U	NA	NA	NA	NA	NA	NA	**2.6**	1 U	1 U	1 U
SULFIDE, REACTIVE (mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TKN (mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS (µg/l)	NA	NA	NA	**1760000**	**2750000**	NA	NA	NA	NA	NA	NA	**1000000**	**121000**	**130000**	**2900000**
TOTAL ORGANIC CARBON (µg/l)	NA	NA	NA	**79400**	**48600**	NA	NA	NA	NA	NA	NA	**17500**	**4300**	**4100**	**53500**
TOTAL SUSPENDED SOLIDS (mg/l)	NA	NA	NA	**37**	**13**	NA	NA	NA	NA	NA	NA	**13**	**44**	**28**	**28**
TPH AS DIESEL (µg/l)	NA	**590000**	**630000**	NA	NA	NA	NA	NA	NA	NA	**480000**	NA	NA	NA	NA
TPH AS GASOLINE (µg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METALS															
ALUMINUM, TOTAL (µg/l)	NA	NA	NA	200 UJ	200 U	NA	NA	NA	NA	NA	NA	200 UJ	200 U	200 U	**56.8 J**
ANTIMONY, TOTAL (µg/l)	NA	NA	NA	2 U	2 U	NA	NA	NA	NA	NA	NA	2 U	2 U	2 U	2 U
ARSENIC, TOTAL (µg/l)	NA	NA	NA	**12.5 J**	**14.8**	NA	NA	NA	NA	NA	NA	**10.5 J**	**3**	**3.4**	**13.5**
BARIUM, TOTAL (µg/l)	NA	NA	NA	**148 J**	**455**	NA	NA	NA	NA	NA	NA	**114 J**	**25.3 J**	**20.7 J**	**289**
BERYLLIUM, TOTAL (µg/l)	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U
CADMIUM, TOTAL (µg/l)	NA	NA	NA	**0.47 J**	1 U	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	1 U
CALCIUM, TOTAL (µg/l)	NA	NA	NA	**162000 J**	**181000**	NA	NA	NA	NA	NA	NA	**73500 J**	**27500**	**23400**	**103000**
CHROMIUM, TOTAL (µg/l)	NA	NA	NA	10 UJ	**2.5 J**	NA	NA	NA	NA	NA	NA	10 UJ	10 U	10 U	10 U
COBALT, TOTAL (µg/l)	NA	NA	NA	50 UJ	**1.1 J**	NA	NA	NA	NA	NA	NA	50 UJ	50 U	50 U	50 U
COPPER, TOTAL (µg/l)	NA	NA	NA	**8.5 J**	25 U	NA	NA	NA	NA	NA	NA	**10.7 J**	25 U	25 U	25 U
CYANIDE, TOTAL (µg/l)	NA	NA	NA	10 U	**4.9 J**	NA	NA	NA	NA	NA	NA	**12.1**	**5.3 J**	**2.2 J**	**13.4**
IRON, TOTAL (µg/l)	NA	NA	NA	**56400 J**	**45800**	NA	NA	NA	NA	NA	NA	**66900 J**	**92400**	**77000**	**105000**
LEAD, TOTAL (µg/l)	NA	25 U	25 U	**1.2 J**	1 U	NA	NA	NA	NA	NA	25 U	**1.9 J**	1 U	1 U	1 U
MAGNESIUM, TOTAL (µg/l)	NA	NA	NA	**41800 J**	**44500**	NA	NA	NA	NA	NA	NA	**19600 J**	**3250 J**	**2870 J**	**24900**
MANGANESE, TOTAL (µg/l)	NA	NA	NA	**254 J**	**592**	NA	NA	NA	NA	NA	NA	**116 J**	**106**	**79.6**	**202**
MERCURY, TOTAL (µg/l)	NA	NA	NA	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL, TOTAL (µg/l)	NA	NA	NA	40 UJ	**4.4 J**	NA	NA	NA	NA	NA	NA	**8.4 J**	40 U	40 U	40 U
POTASSIUM, TOTAL (µg/l)	NA	NA	NA	**13300 J**	**15300**	NA	NA	NA	NA	NA	NA	**7470 J**	**3240 J**	**2890 J**	**8960**
SELENIUM, TOTAL (µg/l)	NA	NA	NA	35 UJ	35 U	NA	NA	NA	NA	NA	NA	35 UJ	35 U	35 U	35 U
SILVER, TOTAL (µg/l)	NA	NA	NA	10 UJ	10 U	NA	NA	NA	NA	NA	NA	10 UJ	10 U	10 U	10 U
SODIUM, TOTAL (µg/l)	NA	NA	NA	**469000 J**	**691000**	NA	NA	NA	NA	NA	NA	**237000 J**	**2040 J**	**2480 J**	**900000**
THALLIUM, TOTAL (µg/l)	NA	NA	NA	**2.8 J**	1 U	NA	NA	NA	NA	NA	NA	**3.9 J**	1 U	1 U	1 U
VANADIUM, TOTAL (µg/l)	NA	NA	NA	50 UJ	**1.8 J**	NA	NA	NA	NA	NA	NA	50 UJ	50 U	50 U	**2.9 J**
ZINC, TOTAL (µg/l)	NA	NA	NA	**38.2 J**	**13.6 J**	NA	NA	NA	NA	NA	NA	**21.8 J**	60 U	**5.7 J**	**56 J**

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-13	MW-13	MW-21	MW-21	MW-21	H-3P (mg/Kg)	H-3P (µg/l)	H-3P (mg/Kg)	H-3P (µg/l)	MW-11	MW-11	MW-11	MW-1	MW-1	MW-11
Field Sample ID	013-MP03	013-M005P	021-M005P	MW-21-GW-AU-R1-0	MW-21-GW-AY-R2-0	H3P-PR-AI-R1-0	H3P-PR-AI-R1-0	H3P-PR-AI-R2-0	H3P-PR-AI-R2-0	011-MP03	011-M005P	MW-11-GW-AZ-R1-0	MW-1-GW-BQ-R1-0	MW-1-GW-BQ-R2-0	MW-11-GW-BA-R2-0
Date Collected	08/06/1993	07/14/1995	07/14/1995	12/16/2009	08/17/2010	9/30/2014	9/30/2014	10/23/2014	10/23/2014	08/06/1993	07/14/1995	12/16/2009	12/17/2009	08/16/2010	08/16/2010
FMP Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A
ORGANICS															
TOTAL PETROLEUM HYDROCARBON (mg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PEST/PCB															
4,4'-DDD (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
4,4'-DDE (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
4,4'-DDT (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ALDRIN (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	0.0053 U
ALPHA-BHC (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	**R**
ALPHA-CHLORDANE (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	0.0053 U
AROCLOR-1016 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1221 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1232 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1242 (µg/l)	NA	NA	NA	**0.061 J**	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	**0.3**	0.096 U	0.11 U
AROCLOR-1248 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1254 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1260 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1262 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
AROCLOR-1268 (µg/l)	NA	NA	NA	0.1 UJ	0.11 U	NA	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.096 U	0.11 U
BETA-BHC (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	**0.25**
CHLORDANE (µg/l)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DELTA-BHC (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	**R**
DIELDRIN (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ENDOSULFAN I (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	0.0053 U
ENDOSULFAN II (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ENDOSULFAN SULFATE (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ENDRIN (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ENDRIN ALDEHYDE (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
ENDRIN KETONE (µg/l)	NA	NA	NA	0.1 U	0.011 U	NA	NA	NA	NA	NA	NA	0.1 U	0.01 U	0.0099 U	0.011 U
GAMMA-BHC (LINDANE) (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	**0.045 JN**
GAMMA-CHLORDANE (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	0.0053 U
HEPTACHLOR (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	**R**
HEPTACHLOR EPOXIDE (µg/l)	NA	NA	NA	0.052 U	0.0053 U	NA	NA	NA	NA	NA	NA	0.051 U	0.0051 U	0.0049 U	0.0053 U
METHOXYCHLOR (µg/l)	NA	NA	NA	0.52 U	0.053 U	NA	NA	NA	NA	NA	NA	0.51 U	0.051 U	0.049 U	0.053 U
TOXAPHENE (µg/l)	NA	NA	NA	5.2 U	0.53 U	NA	NA	NA	NA	NA	NA	5.1 U	0.51 U	0.49 U	0.53 U
SEMIVOLATILES															
1,1'-BIPHENYL (µg/l)	NA	NA	NA	5.1 U	5.3 U	**2.89**	**2312**	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
1,2,4,5-TETRACHLOROBENZENE (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
1,2,4-TRICHLOROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	NA	NA	NA	NA	NA	NA	100000 U	1000000 U	NA	NA	NA	NA
1,2-DICHLOROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	NA	NA	NA	NA	NA	NA	100000 U	1000000 U	NA	NA	NA	NA
1,3-DICHLOROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	NA	NA	NA	NA	NA	NA	100000 U	1000000 U	NA	NA	NA	NA
1,4-DICHLOROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	NA	NA	NA	NA	NA	NA	100000 U	1000000 U	NA	NA	NA	NA
2,2'-OXYBIS(1-CHLOROPROPANE) (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2,3,4,6-TETRACHLOROPHENOL (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
2,4,5-TRICHLOROPHENOL (µg/l)	200000 U	5000000 U	5000000 U	5.1 U	5.3 U	NA	NA	NA	NA	200000 U	5000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2,4,6-TRICHLOROPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2,4-DICHLOROPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2,4-DIMETHYLPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	**7.7**	5.1 U	4.9 U	**14**
2,4-DINITROPHENOL (µg/l)	200000 U	5000000 U	5000000 U	10 UJ	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 UJ	10 UJ	9.8 U	11 U
2,4-DINITROTOLUENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2,6-DINITROTOLUENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2-CHLORONAPHTHALENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2-CHLOROPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2-METHYLNAPHTHALENE (µg/l)	**1800000**	**610000 J**	**660000 J**	**22**	**22**	**405.99**	**324792**	12000 U	NA	**360000**	1000000 U	**15**	**12**	**14**	**8.2**
2-METHYLPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
2-NITROANILINE (µg/l)	200000 U	5000000 U	5000000 U	10 U	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 U	10 U	9.8 U	11 U

Location ID	MW-13	MW-13	MW-21	MW-21	MW-21	H-3P (mg/Kg)	H-3P (µg/l)	H-3P (mg/Kg)	H-3P (µg/l)	MW-11	MW-11	MW-11	MW-1	MW-1	MW-11
Field Sample ID	013-MP03	013-M005P	021-M005P	MW-21-GW-AU-R1-0	MW-21-GW-AY-R2-0	H3P-PR-AI-R1-0	H3P-PR-AI-R1-0	H3P-PR-AI-R2-0	H3P-PR-AI-R2-0	011-MP03	011-M005P	MW-11-GW-AZ-R1-0	MW-1-GW-BQ-R1-0	MW-1-GW-BQ-R2-0	MW-11-GW-BA-R2-0
Date Collected	08/06/1993	07/14/1995	07/14/1995	12/16/2009	08/17/2010	9/30/2014	9/30/2014	10/23/2014	10/23/2014	08/06/1993	07/14/1995	12/16/2009	12/17/2009	08/16/2010	08/16/2010
FMP Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A
2-NITROPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
3,3'-DICHLOROBENZIDINE (µg/l)	100000 U	2000000 U	2000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	2000000 U	5.1 U	5.1 U	4.9 U	5.4 U
3-NITROANILINE (µg/l)	200000 U	5000000 U	5000000 U	10 U	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 U	10 U	9.8 U	11 U
4,6-DINITRO-2-METHYLPHENOL (µg/l)	200000 U	5000000 U	5000000 U	10 U	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 U	10 U	9.8 U	11 U
4-BROMOPHENYL PHENYL ETHER (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
4-CHLORO-3-METHYLPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
4-CHLOROANILINE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	**320000**	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
4-CHLOROPHENYL-PHENYL ETHER (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
4-METHYLPHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	**9.2**	NA	NA	NA	NA	100000 U	1000000 U	**12**	5.1 U	4.9 U	**16**
4-NITROANILINE (µg/l)	200000 U	5000000 U	5000000 U	10 U	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 U	10 U	9.8 U	11 U
4-NITROPHENOL (µg/l)	200000 U	5000000 U	5000000 U	10 U	11 U	NA	NA	NA	NA	200000 U	5000000 U	10 U	10 U	9.8 U	11 U
ACENAPHTHENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**2.35**	**1880**	NA	NA	100000 U	1000000 U	**0.15 J**	0.1 U	1.2 U	0.72 U
ACENAPHTHYLENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**0.44 J**	**352 J**	NA	NA	100000 U	1000000 U	0.51 U	0.1 U	1.2 U	0.72 U
ACETOPHENONE (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
ANTHRACENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**0.65 J**	**520 J**	NA	NA	100000 U	1000000 U	0.51 U	0.1 U	1.2 U	0.72 U
ATRAZINE (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
BENZALDEHYDE (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
BENZO(A)ANTHRACENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	NA	NA	NA	NA	100000 U	1000000 U	**0.13 J**	0.1 U	1.2 U	0.72 U
BENZO(A)PYRENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**0.42 J**	**336 J**	NA	NA	100000 U	1000000 U	0.51 U	0.1 U	1.2 U	0.72 U
BENZO(B)FLUORANTHENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**0.42 J**	**336 J**	NA	NA	100000 U	1000000 U	**0.24 J**	0.1 U	1.2 U	0.72 U
BENZO(G,H,I)PERYLENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	1.75 U	NA	NA	NA	100000 U	1000000 U	**0.17 J**	0.1 U	1.2 U	0.72 U
BENZO(K)FLUORANTHENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	3.49 U	NA	NA	NA	100000 U	1000000 U	**0.16 J**	0.1 U	1.2 U	0.72 U
BENZOIC ACID (µg/l)	100000 U	5000000 U	5000000 U	NA	NA	NA	NA	NA	NA	100000 U	5000000 U	NA	NA	NA	NA
BENZYL ALCOHOL (µg/l)	100000 U	1000000 U	1000000 U	NA	NA	NA	NA	NA	NA	100000 U	1000000 U	NA	NA	NA	NA
BIS(2-CHLOROETHOXY) METHANE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
BIS(2-CHLOROETHYL)ETHER (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
BIS(2-ETHYLHEXYL) PHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	**1.2 J**	**0.62 J**	NA	NA	NA	NA	100000 U	1000000 U	**0.91 J**	**1.7 J**	4.9 U	5.4 U
BUTYL BENZYL PHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
CAPROLACTAM (µg/l)	NA	NA	NA	5.1 U	5.3 U	NA	NA	NA	NA	NA	NA	5.1 U	5.1 U	4.9 U	5.4 U
CARBAZOLE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
CHRYSENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**0.57 J**	**456**	NA	NA	100000 U	1000000 U	**0.21 J**	0.1 U	1.2 U	0.72 U
DIBENZO(A,H)ANTHRACENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	1.75 U	NA	NA	NA	100000 U	1000000 U	0.51 U	0.1 U	1.2 U	0.72 U
DIBENZOFURAN (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
DIETHYLPHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	**23**
DIMETHYLPHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
DI-N-BUTYLPHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
DI-N-OCTYLPHTHALATE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	NA	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
FLUORANTHENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**2.18**	**1744**	1200 U	NA	100000 U	1000000 U	**0.7 J**	0.1 U	1.2 U	**0.61 J**
FLUORENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	**2.09**	**1672**	1200 U	NA	100000 U	1000000 U	0.51 U	0.1 U	1.2 U	0.72 U
HEXACHLOROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	120 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
HEXACHLOROBUTADIENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	240 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
HEXACHLOROCYCLOPENTADIENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	1200 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
HEXACHLOROETHANE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	120 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
INDENO(1,2,3-CD)PYRENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	1.76 U	NA	120 U	NA	100000 U	1000000 U	**0.15 J**	0.1 U	1.2 U	0.72 U
ISOPHORONE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	1200 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
NAPHTHALENE (µg/l)	**6200000**	**3200000**	**3400000**	**74**	**66**	**101.26**	**81008**	1200 U	NA	**930000**	**600000 J**	**140**	**250**	**270**	**100**
NITROBENZENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	120 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
N-NITROSODI-N-PROPYLAMINE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	120 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
N-NITROSODIPHENYLAMINE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	1200 U	NA	100000 U	1000000 U	5.1 U	5.1 U	4.9 U	5.4 U
PENTACHLOROPHENOL (µg/l)	200000 U	5000000 U	5000000 U	10 U	1.1 U	NA	NA	4800 U *	NA	200000 U	5000000 U	1 UJ	0.2 U	2.5 UJ	1.4 UJ
PHENANTHRENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	**0.15 J**	4.39	NA	1200 U	NA	100000 U	1000000 U	**0.28 J**	0.1 U	1.2 U	**0.25 J**
PHENOL (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	5.3 U	NA	NA	1200 U	NA	100000 U	1000000 U	**6.1**	5.1 U	4.9 U	5.4 U
PYRENE (µg/l)	100000 U	1000000 U	1000000 U	5.1 U	0.53 U	NA	NA	1200 U	NA	100000 U	1000000 U	**0.55 J**	0.1 U	1.2 U	0.72 U

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-13	MW-13	MW-21	MW-21	MW-21	H-3P (mg/Kg)	H-3P (µg/l)	H-3P (mg/Kg)	H-3P (µg/l)	MW-11	MW-11	MW-11	MW-1	MW-1	MW-11
Field Sample ID	013-MP03	013-M005P	021-M005P	MW-21-GW-AU-R1-0	MW-21-GW-AY-R2-0	H3P-PR-AI-R1-0	H3P-PR-AI-R1-0	H3P-PR-AI-R2-0	H3P-PR-AI-R2-0	011-MP03	011-M005P	MW-11-GW-AZ-R1-0	MW-1-GW-BQ-R1-0	MW-1-GW-BQ-R2-0	MW-11-GW-BA-R2-0
Date Collected	08/06/1993	07/14/1995	07/14/1995	12/16/2009	08/17/2010	9/30/2014	9/30/2014	10/23/2014	10/23/2014	08/06/1993	07/14/1995	12/16/2009	12/17/2009	08/16/2010	08/16/2010
FMP Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Seep Area	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A	Tank Farm A
VOLATILES															
1,1,1-TRICHLOROETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.62 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,1,2,2-TETRACHLOROETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.6 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (µ	NA	NA	NA	8.5 U	10 U	NA	NA	0.81 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,1,2-TRICHLOROETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.9 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,1-DICHLOROETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.3 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,1-DICHLOROETHENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.88 U	NA	10000 U	31000 U	8.5 U	22 U	**2**	0.5 U
1,2,3-TRICHLOROBENZENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	5.1 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,2,4-TRICHLOROBENZENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	3.4 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,2-DIBROMO-3-CHLOROPROPANE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	4.0 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,2-DIBROMOETHANE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	2.0 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,2-DICHLOROBENZENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.9 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,2-DICHLOROETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.85 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,2-DICHLOROPROPANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.3 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
1,3-DICHLOROBENZENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	2.3 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
1,4-DICHLOROBENZENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	360 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
2-BUTANONE (µg/l)	10000 U	250000 U	62000 U	85 U	100 U	NA	NA	23 U	NA	10000 U	62000 U	85 U	220 U	10 U	5 U
2-HEXANONE (µg/l)	10000 U	250000 U	62000 U	85 U	100 U	NA	NA	5.0 U	NA	10000 U	62000 U	85 U	220 U	10 U	5 U
4-METHYL-2-PENTANONE (µg/l)	10000 U	250000 U	62000 U	85 U	100 U	NA	NA	9.8 U	NA	10000 U	62000 U	85 U	220 U	10 U	5 U
ACETONE (µg/l)	**9500 JB**	250000 U	62000 U	**40 J**	100 U	NA	NA	27 U	NA	**8200 JB**	62000 U	85 U	220 U	10 U	9 U
BENZENE (µg/l)	**110000**	**570000**	**5100 J**	8.5 U	**1.2 J**	**45.39 J**	**36312**	**17**	**13600**	**6200 J**	31000 U	**190**	22 U	**1.3**	**99**
BROMOCHLOROMETHANE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.9 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
BROMODICHLOROMETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.8 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
BROMOFORM (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.2 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
BROMOMETHANE (µg/l)	10000 U	250000 U	62000 U	8.5 U	10 U	NA	NA	0.56 U	NA	10000 U	62000 U	8.5 U	22 U	1 U	0.5 U
CARBON DISULFIDE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.1 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	**0.11 J**
CARBON TETRACHLORIDE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	2.7 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
CHLOROBENZENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	2.0 U	NA	**100000**	31000 U	8.5 U	22 U	1 U	0.5 U
CHLOROETHANE (µg/l)	10000 U	250000 U	62000 U	8.5 U	10 U	NA	NA	1.7 U	NA	10000 U	62000 U	8.5 U	22 U	1 U	0.5 U
CHLOROFORM (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.78 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
CHLOROMETHANE (µg/l)	10000 U	250000 U	62000 U	8.5 U	10 U	NA	NA	0.96 U	NA	10000 U	62000 U	8.5 U	22 U	1 U	0.5 U
CIS-1,2-DICHLOROETHENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.8 U	NA	NA	NA	8.5 U	**28**	**28**	**5.1**
CIS-1,3-DICHLOROPROPENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.8 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
CYCLOHEXANE (µg/l)	NA	NA	NA	**6.8 J**	**4.3 J**	NA	NA	**150**	**120000**	NA	NA	**23**	**75**	**90**	**16**
DIBROMOCHLOROMETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	1.2 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
DICHLORODIFLUOROMETHANE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	2.1 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
DICHLOROMETHANE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	NA	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
ETHYLBENZENE (µg/l)	**1200000**	**1400000**	**100000**	8.5 U	**1.2 J**	**1551.24**	**1240992**	**750**	**600000**	**520000 J**	**86000**	**85**	**200**	**240**	**29**
ISOPROPYLBENZENE (µg/l)	NA	NA	NA	8.5 U	**12**	**465.61**	**372488**	**270**	**216000**	NA	NA	**20**	**73**	**77**	**13 J**
M,P-XYLENE (µg/l)	NA	NA	NA	8.5 U	**0.86 J**	**6290.42**	**5032336**	3.3 U	NA	NA	NA	**75**	**370**	**110**	**18**
METHYL ACETATE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.4 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
METHYLCYCLOHEXANE (µg/l)	NA	NA	NA	**34**	**17**	**1976.48**	**1581184**	**1200**	**960000**	NA	NA	**150**	**78**	**78**	**110**
METHYL-TERT-BUTYL-ETHER (MTBE) (µg/l)	NA	NA	NA	8.5 U	10 U	367.96 U	NA	1.8 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
O-XYLENE (µg/l)	NA	NA	NA	8.5 U	**1.3 J**	**69.87 J**	**55896 J**	**30**	**24000**	NA	NA	**71**	**95**	1 U	**20**
STYRENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	367.22 U	NA	1.2 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
TETRACHLOROETHENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.96 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
TOLUENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	**11.3 J**	**9040 J**	**3.9 J**	**3120**	10000 U	31000 U	**23**	22 U	**0.32 J**	**3 J**
TOTAL-1,2-DICHLOROETHENE (µg/l)	10000 U	120000 U	31000 U	NA	NA	NA	NA	NA	NA	10000 U	31000 U	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.3 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
TRANS-1,3-DICHLOROPROPENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	2.4 U	NA	10000 U	31000 U	8.5 U	22 U	1 U	0.5 U
TRICHLOROETHENE (µg/l)	10000 U	120000 U	31000 U	8.5 U	10 U	NA	NA	0.91 U	NA	10000 U	31000 U	8.5 U	22 U	**0.36 J**	**0.13 J**
TRICHLOROFLUOROMETHANE (µg/l)	NA	NA	NA	8.5 U	10 U	NA	NA	1.4 U	NA	NA	NA	8.5 U	22 U	1 U	0.5 U
VINYL ACETATE (µg/l)	10000 U	250000 U	62000 U	NA	NA	NA	NA	NA	NA	10000 U	62000 U	NA	NA	NA	NA

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	**MW-13**	**MW-13**	**MW-21**	**MW-21**	**MW-21**	**H-3P (mg/Kg)**	**H-3P (µg/l)**	**H-3P (mg/Kg)**	**H-3P (µg/l)**	**MW-11**	**MW-11**	**MW-11**	**MW-1**	**MW-1**	**MW-11**
Field Sample ID	**013-MP03**	**013-M005P**	**021-M005P**	**MW-21-GW-AU-R1-0**	**MW-21-GW-AY-R2-0**	**H3P-PR-AI-R1-0**	**H3P-PR-AI-R1-0**	**H3P-PR-AI-R2-0**	**H3P-PR-AI-R2-0**	**011-MP03**	**011-M005P**	**MW-11-GW-AZ-R1-0**	**MW-1-GW-BQ-R1-0**	**MW-1-GW-BQ-R2-0**	**MW-11-GW-BA-R2-0**
Date Collected	**08/06/1993**	**07/14/1995**	**07/14/1995**	**12/16/2009**	**08/17/2010**	**9/30/2014**	**9/30/2014**	**10/23/2014**	**10/23/2014**	**08/06/1993**	**07/14/1995**	**12/16/2009**	**12/17/2009**	**08/16/2010**	**08/16/2010**
FMP Area	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Seep Area**	**Tank Farm A**	**Tank Farm A**	**Tank Farm A**	**Tank Farm A**	**Tank Farm A**	**Tank Farm A**
VINYL CHLORIDE (µg/l)	10000 U	250000 U	62000 U	8.5 U	10 U	NA	NA	1.4 U	NA	10000 U	62000 U	**5.5 J**	22 U	**0.54 J**	**23**
XYLENES (TOTAL) (µg/l)	**2100000**	**7500000**	**860000**	NA	NA	**6360.29 J**	**5088232**	**3900**	**3120000**	**4600000**	**2500000**	NA	NA	NA	NA

Notes:

5- Cells with bold text indicate a detection of the targeted analyte.
J- The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
U- The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
R- The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
UJ- The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
JN- The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
NA- Not Analyzed.
mg/L- milligrams/Liter
µg/l- micrograms/Liter

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-26	MW-26	PRODUCT TANK	PRODUCT TANK	INLET C	PRODUCT TANK	RIPRAP	Product Tank	Free Prod Rec Sys	FPR081407	Free Prod Rec Sys
Field Sample ID	026-M005P	MW-26-GW-BH-R2-0	WC_PRODUCT _TANK	WC_PRODUCT _TANK	INLET-C-032603	PRODUCT _TANK	RIPRAP-050703	Product Tank	FPR072506	FPR081407	FPR-WC-060811
Date Collected	07/14/1995	08/17/2010	07/24/2002	07/31/2002	03/26/2003	03/26/2003	05/07/2003	4/14/2006	7/25/2006	08/14/07	6/8/2011
FMP Area	Former Gas Station	Former Gas Station									
INORGANICS											
% ASH (%)	NA	NA	NA	NA	**0.05**	**0.0027**	**0.02**	NA	NA	NA	NA
% SULFUR (%)	NA	NA	NA	NA	**0.038**	**0.047**	**0.206**	NA	NA	NA	NA
ALKALINITY (mg/l)	NA	**356**	NA	NA	NA	NA	NA	NA	NA	NA	NA
ALKALINITY, BICARBONATE (mg/l)	NA	**356**	NA	NA	NA	NA	NA	NA	NA	NA	NA
ALKALINITY, CARBONATE (mg/l)	NA	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
AMMONIA, AS N (mg/l)	NA	**15.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA
CARBON DIOXIDE FREE (mg/l)	NA	**192 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA
CHLORIDE (mg/l)	NA	**525 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA
CYANIDE, REACTIVE (mg/l)	NA	NA	25 U	NA	NA	NA	NA	ND	ND	NA	**25.0** U *
ETHANE (µg/l)	NA	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ETHENE (µg/l)	NA	93 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
FERRIC IRON (mg/l)	NA	**10.4**	NA	NA	NA	NA	NA	NA	NA	NA	NA
FERROUS IRON (mg/l)	NA	**54.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA
GRAVITY (µg/l)	**0.761**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HARDNESS AS CALCIUM CARBONATE (mg/l)	NA	**200**	NA	NA	NA	NA	NA	NA	NA	NA	NA
IGNITABILITY (deg f)	NA	NA	160 U	NA	**114**	160 U	160 U	**141**	**91.1**	NA	**107**
METHANE (µg/l)	NA	**13000**	NA	NA	NA	NA	NA	NA	NA	NA	NA
NITRATE (mg/l)	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
PH (su)	NA	NA	**7.19**	NA	**7.08**	**6.7**	**6.28**	**6.76**	**5.98**	NA	**6.36** HF
PHOSPHORUS (mg/l)	NA	0.32 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFATE (mg/l)	NA	5 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE (mg/l)	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
SULFIDE, REACTIVE (mg/l)	NA	NA	20 U	NA	NA	NA	NA	ND	ND	NA	**20.0** U
TKN (mg/l)	NA	NA	NA	NA	**82.5**	0.5 U	**2.1**	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS (µg/l)	NA	**1080000**	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL ORGANIC CARBON (µg/l)	NA	**20400**	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL SUSPENDED SOLIDS (mg/l)	NA	**42**	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH AS DIESEL (µg/l)	**690000**	NA	NA	NA	**390**	**251**	**1450**	NA	NA	NA	NA
TPH AS GASOLINE (µg/l)	NA	NA	NA	NA	**21000**	**6100**	NA	NA	NA	NA	NA
METALS											
ALUMINUM, TOTAL (µg/l)	NA	200 U	NA	NA	**36800**	947 U	748 U	NA	NA	NA	NA
ANTIMONY, TOTAL (µg/l)	NA	2 U	NA	NA	39.1 U	39.1 U	46 U	NA	NA	NA	NA
ARSENIC, TOTAL (µg/l)	NA	**9.5**	NA	NA	**112**	27.3 U	37 U	NA	NA	NA	NA
BARIUM, TOTAL (µg/l)	NA	**34.2 J**	NA	NA	**859**	**52.8**	**145**	NA	NA	NA	NA
BERYLLIUM, TOTAL (µg/l)	NA	1 U	NA	NA	**3.6**	1.7 U	1 U	NA	NA	NA	NA
CADMIUM, TOTAL (µg/l)	NA	1 U	NA	NA	**3.1**	3.1 U	5 U	NA	NA	NA	NA
CALCIUM, TOTAL (µg/l)	NA	**55000**	NA	NA	**101000**	**27700**	**51900**	NA	NA	NA	NA
CHROMIUM, TOTAL (µg/l)	NA	10 U	NA	NA	**160**	11.1 U	9 U	NA	NA	NA	NA
COBALT, TOTAL (µg/l)	NA	50 U	NA	NA	**24.2**	**15.7**	7 U	NA	NA	NA	NA
COPPER, TOTAL (µg/l)	NA	25 U	NA	NA	**294**	**28.3**	**23**	NA	NA	NA	NA
CYANIDE, TOTAL (µg/l)	NA	**2.9 J**	NA	NA	**200**	5.3 U	0.55 U	NA	NA	NA	NA
IRON, TOTAL (µg/l)	NA	**64800**	NA	NA	**156000**	**89300**	**3260**	NA	NA	NA	NA
LEAD, TOTAL (µg/l)	25 U	1 U	NA	NA	**368**	25.5 U	17 U	NA	NA	NA	NA
MAGNESIUM, TOTAL (µg/l)	NA	**13100**	NA	NA	**48700**	**4280**	**9250**	NA	NA	NA	NA
MANGANESE, TOTAL (µg/l)	NA	**51.6**	NA	NA	**872**	**206**	**262**	NA	NA	NA	NA
MERCURY, TOTAL (µg/l)	NA	0.2 U	NA	NA	1 U	1 U	1 U	NA	NA	NA	NA
NICKEL, TOTAL (µg/l)	NA	40 U	NA	NA	**62.6**	17.6 U	11 U	NA	NA	NA	NA
POTASSIUM, TOTAL (µg/l)	NA	**12100**	NA	NA	**12500**	**6070**	**5710**	NA	NA	NA	NA
SELENIUM, TOTAL (µg/l)	NA	35 U	NA	NA	46.2 U	46.2 U	45 U	NA	NA	NA	NA
SILVER, TOTAL (µg/l)	NA	10 U	NA	NA	8.8 U	**9.4**	9 U	NA	NA	NA	NA
SODIUM, TOTAL (µg/l)	NA	**372000**	NA	NA	**134000**	**26000**	**83900**	NA	NA	NA	NA
THALLIUM, TOTAL (µg/l)	NA	1 U	NA	NA	49 U	49 U	49 U	NA	NA	NA	NA
VANADIUM, TOTAL (µg/l)	NA	50 U	NA	NA	**142**	14.7 U	10 U	NA	NA	NA	NA
ZINC, TOTAL (µg/l)	NA	**4.4 J**	NA	NA	**1110**	**142**	146 U	NA	NA	NA	NA

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-26	MW-26	PRODUCT TANK	PRODUCT TANK	INLET C	PRODUCT TANK	RIPRAP	Product Tank	Free Prod Rec Sys	FPR081407	Free Prod Rec Sys
Field Sample ID	**026-M005P**	**MW-26-GW-BH-R2-0**	**WC_PRODUCT_TANK**	**WC_PRODUCT_TANK**	**INLET-C-032603**	**PRODUCT_TANK**	**RIPRAP-050703**	**Product Tank**	**FPR072506**	**FPR081407**	**FPR-WC-060811**
Date Collected	**07/14/1995**	**08/17/2010**	**07/24/2002**	**07/31/2002**	**03/26/2003**	**03/26/2003**	**05/07/2003**	**4/14/2006**	**7/25/2006**	**08/14/07**	**6/8/2011**
FMP Area	**Former Gas Station**	**Former Gas Station**									
ORGANICS											
TOTAL PETROLEUM HYDROCARBON (mg/l)	NA	NA	**1120**	NA	NA	NA	NA	NA	NA	NA	NA
PEST/PCB											
4,4'-DDD (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
4,4'-DDE (µg/l)	NA	0.0095 U	NA	0.05 U	**0.44 J**	0.2 U	0.17 U	NA	NA	NA	NA
4,4'-DDT (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ALDRIN (µg/l)	NA	0.0048 U	NA	**0.1**	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
ALPHA-BHC (µg/l)	NA	0.0048 U	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
ALPHA-CHLORDANE (µg/l)	NA	0.0048 U	NA	NA	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
AROCLOR-1016 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1221 (µg/l)	NA	0.094 U	NA	0.5 U	4 U	4 U	3.3 U	NA	NA	NA	NA
AROCLOR-1232 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1242 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1248 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1254 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1260 (µg/l)	NA	0.094 U	NA	0.5 U	2 U	2 U	1.7 U	NA	NA	NA	NA
AROCLOR-1262 (µg/l)	NA	0.094 U	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA
AROCLOR-1268 (µg/l)	NA	0.094 U	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA
BETA-BHC (µg/l)	NA	**0.033 JN**	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
CHLORDANE (µg/l)	NA	NA	NA	0.5 U	NA	NA	NA	NA	NA	NA	NA
DELTA-BHC (µg/l)	NA	**R**	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
DIELDRIN (µg/l)	NA	0.0095 U	NA	**0.094 J**	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ENDOSULFAN I (µg/l)	NA	0.0048 U	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
ENDOSULFAN II (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ENDOSULFAN SULFATE (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ENDRIN (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ENDRIN ALDEHYDE (µg/l)	NA	0.0095 U	NA	0.05 U	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
ENDRIN KETONE (µg/l)	NA	0.0095 U	NA	NA	0.2 U	0.2 U	0.17 U	NA	NA	NA	NA
GAMMA-BHC (LINDANE) (µg/l)	NA	**0.0066 JN**	NA	**0.22**	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
GAMMA-CHLORDANE (µg/l)	NA	0.0048 U	NA	NA	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
HEPTACHLOR (µg/l)	NA	**R**	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
HEPTACHLOR EPOXIDE (µg/l)	NA	0.0048 U	NA	0.05 U	0.1 U	0.1 U	0.083 U	NA	NA	NA	NA
METHOXYCHLOR (µg/l)	NA	0.048 U	NA	NA	1 U	1 U	0.83 U	NA	NA	NA	NA
TOXAPHENE (µg/l)	NA	0.48 U	NA	0.5 U	10 U	10 U	8.3 U	NA	NA	NA	NA
SEMIVOLATILES											
1,1'-BIPHENYL (µg/l)	NA	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
1,2,4,5-TETRACHLOROBENZENE (µg/l)	NA	4.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-DICHLOROBENZENE (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-OXYBIS(1-CHLOROPROPANE) (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2,3,4,6-TETRACHLOROPHENOL (µg/l)	NA	4.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-TRICHLOROPHENOL (µg/l)	2000000 U	4.9 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
2,4,6-TRICHLOROPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2,4-DICHLOROPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2,4-DIMETHYLPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2,4-DINITROPHENOL (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
2,4-DINITROTOLUENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2,6-DINITROTOLUENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2-CHLORONAPHTHALENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2-CHLOROPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2-METHYLNAPHTHALENE (µg/l)	**460000 J**	**14**	NA	NA	**360 J**	**180 J**	**15 J**	NA	NA	NA	NA
2-METHYLPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
2-NITROANILINE (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	**MW-26**	**MW-26**	**PRODUCT TANK**	**PRODUCT TANK**	**INLET C**	**PRODUCT TANK**	**RIPRAP**	**Product Tank**	**Free Prod Rec Sys**	**FPR081407**	**Free Prod Rec Sys**
Field Sample ID	**026-M005P**	**MW-26-GW-BH-R2-0**	**WC_PRODUCT _TANK**	**WC_PRODUCT _TANK**	**INLET-C-032603**	**PRODUCT _TANK**	**RIPRAP-050703**	**Product Tank**	**FPR072506**	**FPR081407**	**FPR-WC-060811**
Date Collected	**07/14/1995**	**08/17/2010**	**07/24/2002**	**07/31/2002**	**03/26/2003**	**03/26/2003**	**05/07/2003**	**4/14/2006**	**7/25/2006**	**08/14/07**	**6/8/2011**
FMP Area	**Former Gas Station**	**Former Gas Station**									
2-NITROPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
3,3'-DICHLOROBENZIDINE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
3-NITROANILINE (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
4,6-DINITRO-2-METHYLPHENOL (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
4-BROMOPHENYL PHENYL ETHER (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
4-CHLORO-3-METHYLPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
4-CHLOROANILINE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
4-CHLOROPHENYL-PHENYL ETHER (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
4-METHYLPHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
4-NITROANILINE (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
4-NITROPHENOL (µg/l)	2000000 U	9.8 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
ACENAPHTHENE (µg/l)	1000000 U	1.2 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
ACENAPHTHYLENE (µg/l)	1000000 U	1.2 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
ACETOPHENONE (µg/l)	NA	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
ANTHRACENE (µg/l)	1000000 U	1.2 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
ATRAZINE (µg/l)	NA	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
BENZALDEHYDE (µg/l)	NA	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
BENZO(A)ANTHRACENE (µg/l)	1000000 U	1.2 U	NA	NA	**120 J**	1000 U	25 U	NA	NA	NA	NA
BENZO(A)PYRENE (µg/l)	1000000 U	1.2 U	NA	NA	**110 J**	1000 U	25 U	NA	NA	NA	NA
BENZO(B)FLUORANTHENE (µg/l)	1000000 U	1.2 U	NA	NA	**210 J**	1000 U	25 U	NA	NA	NA	NA
BENZO(G,H,I)PERYLENE (µg/l)	1000000 U	1.2 U	NA	NA	**100 J**	1000 U	25 U	NA	NA	NA	NA
BENZO(K)FLUORANTHENE (µg/l)	1000000 U	1.2 U	NA	NA	**84 J**	1000 U	25 U	NA	NA	NA	NA
BENZOIC ACID (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BENZYL ALCOHOL (µg/l)	1000000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BIS(2-CHLOROETHOXY) METHANE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
BIS(2-CHLOROETHYL)ETHER (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
BIS(2-ETHYLHEXYL) PHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
BUTYL BENZYL PHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
CAPROLACTAM (µg/l)	NA	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
CARBAZOLE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
CHRYSENE (µg/l)	1000000 U	1.2 U	NA	NA	**160 J**	1000 U	25 U	NA	NA	NA	NA
DIBENZO(A,H)ANTHRACENE (µg/l)	1000000 U	1.2 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
DIBENZOFURAN (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
DIETHYLPHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
DIMETHYLPHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
DI-N-BUTYLPHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
DI-N-OCTYLPHTHALATE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
FLUORANTHENE (µg/l)	1000000 U	1.2 U	NA	NA	**330 J**	1000 U	25 U	NA	NA	NA	NA
FLUORENE (µg/l)	1000000 U	1.2 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
HEXACHLOROBENZENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
HEXACHLOROBUTADIENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
HEXACHLOROCYCLOPENTADIENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
HEXACHLOROETHANE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
INDENO(1,2,3-CD)PYRENE (µg/l)	1000000 U	1.2 U	NA	NA	**100 J**	1000 U	25 U	NA	NA	NA	NA
ISOPHORONE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
NAPHTHALENE (µg/l)	**1600000**	**170**	NA	NA	**1300 J**	**790 J**	**140**	NA	NA	NA	NA
NITROBENZENE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
N-NITROSODI-N-PROPYLAMINE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
N-NITROSODIPHENYLAMINE (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
PENTACHLOROPHENOL (µg/l)	2000000 U	2.5 U	NA	NA	10000 U	2500 U	62 U	NA	NA	NA	NA
PHENANTHRENE (µg/l)	1000000 U	1.2 U	NA	NA	**100 J**	1000 U	25 U	NA	NA	NA	NA
PHENOL (µg/l)	1000000 U	4.9 U	NA	NA	4000 U	1000 U	25 U	NA	NA	NA	NA
PYRENE (µg/l)	1000000 U	1.2 U	NA	NA	**270 J**	1000 U	25 U	NA	NA	NA	NA

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	MW-26	MW-26	PRODUCT TANK	PRODUCT TANK	INLET C	PRODUCT TANK	RIPRAP	Product Tank	Free Prod Rec Sys	FPR081407	Free Prod Rec Sys
Field Sample ID	**026-M005P**	**MW-26-GW-BH-R2-0**	**WC_PRODUCT_TANK**	**WC_PRODUCT_TANK**	**INLET-C-032603**	**PRODUCT_TANK**	**RIPRAP-050703**	**Product Tank**	**FPR072506**	**FPR081407**	**FPR-WC-060811**
Date Collected	**07/14/1995**	**08/17/2010**	**07/24/2002**	**07/31/2002**	**03/26/2003**	**03/26/2003**	**05/07/2003**	**4/14/2006**	**7/25/2006**	**08/14/07**	**6/8/2011**
FMP Area	**Former Gas Station**	**Former Gas Station**									
VOLATILES											
1,1,1-TRICHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
1,1,2,2-TETRACHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	100 U	NA	NA	NA
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE (µ	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,1,2-TRICHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	300 U	NA	NA	NA
1,1-DICHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
1,1-DICHLOROETHENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	200 U	NA	NA	NA
1,2,3-TRICHLOROBENZENE (µg/l)	NA	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-TRICHLOROBENZENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,2-DIBROMO-3-CHLOROPROPANE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,2-DIBROMOETHANE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,2-DICHLOROBENZENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,2-DICHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	200 U	NA	NA	NA
1,2-DICHLOROPROPANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	100 U	NA	NA	NA
1,3-DICHLOROBENZENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
1,4-DICHLOROBENZENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
2-BUTANONE (µg/l)	62000 U	50 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
2-HEXANONE (µg/l)	62000 U	50 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
4-METHYL-2-PENTANONE (µg/l)	62000 U	50 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
ACETONE (µg/l)	62000 U	50 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
BENZENE (µg/l)	**4400 J**	**26**	NA	NA	**97 J**	**460**	NA	**260**	NA	NA	NA
BROMOCHLOROMETHANE (µg/l)	NA	5 U	NA	NA	NA	NA	NA	100 U	NA	NA	NA
BROMODICHLOROMETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
BROMOFORM (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	400 U	NA	NA	NA
BROMOMETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CARBON DISULFIDE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
CARBON TETRACHLORIDE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	200 U	NA	NA	NA
CHLOROBENZENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CHLOROETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CHLOROFORM (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CHLOROMETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CIS-1,2-DICHLOROETHENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CIS-1,3-DICHLOROPROPENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
CYCLOHEXANE (µg/l)	NA	**25**	NA	NA	**28 J**	**3 J**	NA	NA	NA	NA	NA
DIBROMOCHLOROMETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
DICHLORODIFLUOROMETHANE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
DICHLOROMETHANE (µg/l)	62000 U	5 U	NA	NA	250 U	**45 J**	NA	NA	NA	NA	NA
ETHYLBENZENE (µg/l)	**11000 J**	**21**	NA	NA	**530**	**290**	NA	**2100**	NA	NA	NA
ISOPROPYLBENZENE (µg/l)	NA	**83**	NA	NA	**91 J**	**36 J**	NA	NA	NA	NA	NA
M,P-XYLENE (µg/l)	NA	**11**	NA	NA	NA	NA	NA	NA	NA	NA	NA
METHYL ACETATE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
METHYLCYCLOHEXANE (µg/l)	NA	**54**	NA	NA	**240 J**	**37 J**	NA	NA	NA	NA	NA
METHYL-TERT-BUTYL-ETHER (MTBE) (µg/l)	NA	5 U	NA	NA	250 U	**23 J**	NA	NA	NA	NA	NA
O-XYLENE (µg/l)	NA	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
STYRENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
TETRACHLOROETHENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	100 U	NA	NA	NA
TOLUENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
TOTAL-1,2-DICHLOROETHENE (µg/l)	62000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRANS-1,2-DICHLOROETHENE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
TRANS-1,3-DICHLOROPROPENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
TRICHLOROETHENE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	100 U	NA	NA	NA
TRICHLOROFLUOROMETHANE (µg/l)	NA	5 U	NA	NA	250 U	50 U	NA	500 U	NA	NA	NA
VINYL ACETATE (µg/l)	62000 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 6-4
Summary of Historical LNAPL Analytical Results Collected From Wells
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	**MW-26**	**MW-26**	**PRODUCT TANK**	**PRODUCT TANK**	**INLET C**	**PRODUCT TANK**	**RIPRAP**	**Product Tank**	**Free Prod Rec Sys**	**FPR081407**	**Free Prod Rec Sys**
Field Sample ID	**026-M005P**	**MW-26-GW-BH-R2-0**	**WC_PRODUCT _TANK**	**WC_PRODUCT _TANK**	**INLET-C-032603**	**PRODUCT _TANK**	**RIPRAP-050703**	**Product Tank**	**FPR072506**	**FPR081407**	**FPR-WC-060811**
Date Collected	**07/14/1995**	**08/17/2010**	**07/24/2002**	**07/31/2002**	**03/26/2003**	**03/26/2003**	**05/07/2003**	**4/14/2006**	**7/25/2006**	**08/14/07**	**6/8/2011**
FMP Area	**Former Gas Station**	**Former Gas Station**									
VINYL CHLORIDE (µg/l)	62000 U	5 U	NA	NA	250 U	50 U	NA	NA	NA	NA	NA
XYLENES (TOTAL) (µg/l)	**420000**	NA	NA	NA	**3700**	**1500**	NA	**12000**	NA	NA	NA

Notes:

5- Cells with bold text indicate a detection of the targeted analyte.
J- The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
U- The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
R- The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
UJ- The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
JN- The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
NA- Not Analyzed.
mg/L- milligrams/Liter
µg/l- micrograms/Liter

Table 6-5
Summary of Historical LNAPL Waste Disposal Analytical Results
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	**PRODUCT TANK**	**PRODUCT TANK**	**Product Tank**	**Free Prod Rec Sys**	**FPR081407**	**Free Prod Rec Sys**
Field Sample ID	**WC_PRODUCT_ TANK**	**PRODUCT _TANK**	**Product Tank**	**FPR072506**	**FPR081407**	**FPR-WC-060811**
Date Collected	**07/24/2002**	**03/26/2003**	**4/14/2006**	**7/25/2006**	**8/14/2007**	**6/8/2011**
TCLP METAL						
ARSENIC, TCLP (mg/l)	0.018 U	NA	0.0047 U	**0.09**	NA	0.94 U
BARIUM, TCLP (mg/l)	**0.41**	NA	**0.04**	0.015 U	NA	0.19 U
CADMIUM, TCLP (mg/l)	0.002 U	NA	0.0006 U	0.006 U	NA	0.094 U
CHROMIUM, TCLP (mg/l)	0.0055 U	NA	0.003 U	0.03 U	NA	0.38 U
LEAD, TCLP (mg/l)	0.01 U	NA	0.0027 U	**0.07**	NA	0.47 U
MERCURY, TCLP (mg/l)	0.0001 U	NA	0.0001 U	**0.005**	NA	0.0075 U
SELENIUM, TCLP (mg/l)	0.023 U	NA	0.0049 U	0.049 U	NA	1.4 U
SILVER, TCLP (mg/l)	0.0055 U	NA	0.0025 U	0.025 U	NA	0.28 U
TCLP HERBICIDES						
2,4,5-TP (SILVEX), TCLP (mg/l)	0.08 U	NA	0.08 U	0.00000038 U	NA	2.4 U
2,4-D, TCLP (mg/l)	0.08 U	NA	0.08 U	0.00000038 U	NA	2.4 U
TCLP PESTICIDES						
CHLORDANE, TCLP (mg/l)	0.005 U	NA	0.005 U	0.5 U	0.005 U	1.0 U
ENDRIN, TCLP (mg/l)	0.0005 U	NA	0.0005 U	0.05 U	0.0005 U	0.10 U *
GAMMA-BHC, TCLP (mg/l)	0.0005 U	NA	0.0005 U	0.05 U	0.0005 U	0.10 U
HEPTACHLOR EPOXIDE, TCLP (mg/l)	0.0005 U	NA	0.0005 U	0.05 U	0.0005 U	0.10 U
HEPTACHLOR, TCLP (mg/l)	0.0005 U	NA	0.0005 U	0.05 U	0.0005 U	0.10 U
METHOXYCHLOR, TCLP (mg/l)	0.0005 U	NA	0.0005 U	0.05 U	0.0005 U	0.10 U
TOXAPHENE, TCLP (mg/l)	0.005 U	NA	0.005 U	0.5 U	0.005 U	1.0 U
TCLP SEMIVOLATILES						
1,4-DICHLOROBENZENE, TCLP (mg/l)	0.08 U	NA	0.04 U	500 U	500 U	500 U H
2,4,5-TRICHLOROPHENOL, TCLP (mg/l)	0.08 U	NA	0.04 U	500 U	500 U	500 U H
2,4,6-TRICHLOROPHENOL, TCLP (mg/l)	0.08 U	NA	0.04 U	500 U	500 U	500 U H
2,4-DINITROTOLUENE, TCLP (mg/l)	0.016 U	NA	0.008 U	100 U	100 U	100 U H
2-METHYLPHENOL, TCLP (mg/l)	0.08 U	NA	NA	NA	NA	NA
HEXACHLOROBENZENE, TCLP (mg/l)	0.008 U	NA	0.004 U	50 U	50 U	50 U H
HEXACHLOROBUTADIENE, TCLP (mg/l)	0.016 U	NA	0.008 U	100 U	100 U	100 U H
HEXACHLOROETHANE, TCLP (mg/l)	0.008 U	NA	0.004 U	50 U	50 U	50 U H
M&P-CRESOL, TCLP (mg/l)	0.08 U	NA	**0.0023 J**	500 U	500 U	500 U H *
NITROBENZENE, TCLP (mg/l)	0.008 U	NA	0.004 U	50 U	50 U	50 U H
PENTACHLOROPHENOL, TCLP (mg/l)	0.32 U	NA	0.04 U	2000 U	2000 U	1500 U H
PYRIDINE, TCLP (mg/l)	0.08 U	NA	0.04 U	500 U	500 U	500 U H *
TCLP VOLATILES						
1,1-DICHLOROETHENE, TCLP (mg/l)	0.002 U	NA	0.05 U	10 U	0.01 U	0.50 U
1,2-DICHLOROETHANE, TCLP (mg/l)	0.002 U	NA	0.05 U	10 U	0.01 U	0.50 U
BENZENE, TCLP (mg/l)	0.001 U	NA	**0.2**	**490**	0.2 U	**49**
CARBON TETRACHLORIDE, TCLP (mg/l)	0.002 U	NA	0.05 U	10 U	0.01 U	0.50 U
CHLOROBENZENE, TCLP (mg/l)	0.005 U	NA	0.12 U	25 U	0.025 U	0.50 U
CHLOROFORM, TCLP (mg/l)	0.005 U	NA	0.12 U	25 U	0.025 U	0.50 U
METHYL ETHYL KETONE, TCLP (mg/l)	0.005 U	NA	0.12 U	25 U	0.025 U	5.0 U
TETRACHLOROETHENE, TCLP (mg/l)	0.001 U	NA	0.025 U	5 U	0.005 U	0.50 U
TRICHLOROETHYLENE (TCE), TCLP (mg/l)	0.001 U	NA	0.025 U	5 U	0.005 U	0.50 U
VINYL CHLORIDE, TCLP (mg/l)	0.005 U	NA	0.12 U	25 U	0.025 U	0.50 U

Notes:

5- Cells with bold text indicate a detection of the targeted analyte.

J- The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

U- The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

NA- Not Analyzed.

mg/L- milligrams/Liter

* - Recovery or RPD exceeds control limits

H - Sample was prepped or analyzed beyond the specified holding time

Table 6-8
LNAPL Pore Fluid Saturation Data
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample ID	Depth (ft bgs)	Water Bearing Zone	USCS Classification	Pore Fluid Saturation (% Pore Volume)	
				Water	NAPL
DP-1 (15.3'-16.0')	15.3-15.5	Shallow	SM	54.0	4.7
DP-2 (12.0'-12.6')	12.0-12.2	Shallow	SP	53.3	3.9
DP-5 (11.5'-12.2')	11.5-11.7	Shallow	SM	61.9	7.4
DP-8 (12.0'-12.7')	12.0-12.2	Shallow	SM	69.6	2.0
DP-13 (6.5'-7.2')	6.5-6.7	Shallow	SM	72.1	4.3
DP-14 (13.5'-14.2')	13.5-13.7	Shallow	SM	70.6	2.2
DP-15 (11.0'-11.7')	11.0-11.2	Shallow	SP	71.2	1.1
DP-16 (3.3'-4.0')	3.3-3.7	Shallow	SP	39.4	2.4
DP-17 (1.9'-2.5')	1.9-2.2	Shallow	GP	43.4	3.8
DP-17 (4.4'-5.0')	4.4-4.6	Shallow	SM	69.0	1.9
DP-18 (6.5'-7.2')	6.5-6.7	Shallow	ML	67.6	0.7
DP-20 (8.0'-8.8')	8.0-8.2	Shallow	SP	69.6	3.3
DP-21 (10.7'-11.2')	10.7-10.9	Shallow	SM	58.1	5.5
DP-21 (14.0'-14.6')	14.0-14.6	Shallow	SP	63.5	5.0
DP-21 (16.9'-17.3')	17.1-17.3	Shallow	SM	79.1	1.0
DP-22 (7.3'-8.0')	7.5-7.7	Shallow	SM/SP	51.0	1.4
DP-22 (11.3'-12.0')	11.8-12.0	Shallow	SM	56.4	8.7
DP-22 (17.7'-18.3')	17.7-17.9	Shallow	SM	67.1	1.5
DP-22 (20.5'-21.0')	20.5-21.0	Shallow	SP	80.7	4.8
DP-23 (11.0'-11.7')	11.0-11.2	Shallow	SM	28.8	2.2
DP-23 (16.0'-16.7')	16.0-16.2	Shallow	SM	71.6	0.1
DP-24 (17.0'-17.5')	17.0-17.2	Shallow	SM	86.2	0.3

Notes:
ft bgs = feet below ground surface
NAPL = Non-aqueous phase liquid
VB = bulk volume
USCS Classifications, water bearing zones, and depth to saturated zones sourced from boring logs.

Table 6-9
Imbibition Testing Summary of Results
The Sherwin-Williams Company
Gibbsboro, New Jersey

Well/Sample ID	Water Bearing Zone	Specific Sample Depth (ft bgs)	Sample Orientation[1]	Moisture Content (% weight)	Density		Porosity (%Vb)[2]		Pore Fluid Saturation (% Pore Volume)[3]				Change In Saturations Via Imbibition (% Pore Volume)	
					Dry Bulk (g/cc)	Grain (g/cc)	Total	Air Filled	Prior to Imbibition Capillary Pressure		After Imbibition Capillary Pressure			
									Water (Swi) Saturation	NAPL (Soi) Saturation	Water (Srw) Saturation	NAPL (Sor) Saturation	Water	NAPL
DP-4 (13.5-14.2)	Shallow	13.9	H	15.6	1.39	2.67	47.98	9.8	41.3	4.8	74.8	4.8	33.5	0
DP-9 (8-8.8)	Shallow	8.4	H	14.4	1.46	2.66	45.19	2.8	43.5	3.5	90.3	3.5	46.8	0
DP-13 (2.2-3)	Shallow	2.7	H	9.3	1.42	2.65	46.15	6.4	27.0	2.2	84.0	2.2	57	0
DP-14 (6.8-7.5)	Shallow	6.8	H	23.7	1.52	2.70	43.51	2.3	78.5	5.7	88.9	5.7	10.4	0
DP-15 (6.8-7.4)	Shallow	7.2	H	18.2	1.33	2.67	50.23	13.3	46.1	3.0	70.5	3.0	24.4	0
DP-17 (3-3.6)	Shallow	3.0	H	17.4	1.55	2.67	41.80	7.4	61.6	4.3	78.0	4.3	16.4	0
DP-18 (3.5-4.2)	Shallow	3.5	H	13.8	1.52	2.67	43.18	11.5	47.2	5.1	68.3	5.1	21.1	0
DP-20 (6.2-6.8)	Shallow	6.7	H	14.4	1.42	2.66	46.49	1.8	39.3	6.1	90.2	6.1	50.9	0
DP-21 (11.2-11.7)	Shallow	11.5	H	20.2	1.43	2.68	46.69	8.8	60.1	1.7	79.5	1.7	19.4	0
DP-22 (13.5-14.2)	Shallow	13.5	H	22.5	1.42	2.69	47.02	1.7	61.2	8.3	88.1	8.3	26.9	0
DP-23 (14-14.7)	Shallow	14.0	H	21.5	1.39	2.67	47.89	10.8	59.1	3.6	73.8	3.6	14.7	0
DP-24 (13.5-14.2)	Shallow	13.9	H	19.2	1.55	2.68	42.14	3.2	50.2	3.6	88.8	3.6	38.6	0

Notes:
ft bgs = feet below ground surface
g = grams
cc = cubic centimeter
NAPL = Non-aqueous phase liquid
Vb = bulk volume
Swi = Initial Water Saturation as received prior to testing
Srw = Residual Water Saturation after testing
Soi = Initial NAPL Saturation as received prior to testing
Sor = Residual NAPL Saturation after testing
USCS Classifications, water bearing zones, and depth to saturated zones sourced from boring logs
(1) = Sample Orientation: H=horizontal; V - vertical; R - remold
(2) = Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids
(3) Fluid density used to calculate pore fluid saturation; Water = 0.9996 g/cc; NAPL = 0.7923 g/ccc

Table 6-10
Effective Solubility Calculations (MW-11)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Constituent	Pure-Phase Density (g/cm3)	Molecular Weight [1] (g/mol)	Pure-Phase Solubility (mg/L) (25 deg C)	Pure Phase Vapor Pressure (mm Hg) (25 deg C)	MW-11 Concentration (mg/kg)	MW-11 Concentration (mol/kg)	MW-11 Percent Mass Fraction	MW-11 Percent Mole Fraction	MW-11 Estimated Effective Solubility (µg/L)	Maximum Potential Soil Gas Concentration from LNAPL Source (µg/m3)
Aliphatic Hydrocarbons										
C9 - C12		149.00	0.07	0.00087	770,000	5.1678	77.00%	87.85%	61	6128
Semivolatile Organic Compounds - TICs										
1,2,4,5-Tetramethylbenzene	0.868	134.22	3.48	1.06	5,300	0.0395	0.53%	0.67%	23	51390
1,3-Diethyl Benzene	0.864	134.22	24.00	1.13	4,900	0.0365	0.49%	0.62%	149	50650
Cis-1,3-Dimethyl Cyclohexane	0.784	112.22	11.70	21.50	5,800	0.0517	0.58%	0.88%	103	1140690
Cis-Decahydronaphthalene	0.890	138.25	0.889	2.30	7,700	0.0557	0.77%	0.95%	8	162002
Cyclopentane, 1,2,4-Trimethyl- (1.Alpha	0.754	112.22	3.70	21.80	4,900	0.0437	0.49%	0.74%	27	977133
O-Cymene (O-Isopropyltoluene)	0.877	134.22	23.30	1.50	8,300	0.0618	0.83%	1.05%	245	113886
Semivolatile Organic Compounds										
2-Methylnaphthalene	1.006	142.20	24.60	0.06	130	0.0009	0.01%	0.02%	4	65
Naphthalene	1.162	128.17	31.00	0.09	50	0.0004	0.01%	0.01%	2	39
Volatile Organic Compounds -TICs										
1,2-Diethylbenzene	0.880	134.22	71.10	1.05	870	0.0065	0.09%	0.11%	78	8356
1,3-Cyclopentadiene, 1,2,3,4-Tetramethyl-5-Methylene	0.859	134.22	1.84	1.97	980	0.0073	0.10%	0.12%	2	17660
1,4-Dimethylcyclohexane	0.766	112.21	11.70	17.90	1,300	0.0116	0.13%	0.20%	23	212862
1,2-Dimethyl-4-Ethylbenzene	0.867	134.22	12.70	0.75	990	0.0074	0.10%	0.13%	16	6774
Cis-1,3-Dimethyl Cyclohexane	0.784	112.21	11.70	21.50	9,500	0.0847	0.95%	1.44%	168	1868371
Decahydro Naphthalene	0.897	138.25	0.89	2.30	1,300	0.0094	0.13%	0.16%	1	27351
Ethyl Cyclohexane	0.804	112.21	3.96	12.80	1,100	0.0098	0.11%	0.17%	7	128796
Ethylmethyl Cyclohexane	0.777	126.24	3.68	4.27	1,900	0.0151	0.19%	0.26%	9	74213
Trans-1,2-Dimethylcyclohexane	0.770	112.21	11.67	19.40	990	0.0088	0.10%	0.15%	18	175686
Volatile Organic Compounds										
Benzene	0.876	78.11	1790.00	94.80	5	0.0001	0.00%	0.00%	19	4336
Cyclohexane	0.778	84.16	55.00	96.90	130	0.0015	0.01%	0.03%	14	115231
Ethylbenzene	0.863	106.47	170.00	9.60	10	0.0001	0.00%	0.00%	3	878
Isopropylbenzene (Cumene)	0.862	120.19	61.30	4.50	260	0.0022	0.03%	0.04%	23	10703
M,P-Xylene	0.870	106.17	161.00	8.29	3	0.0000	0.00%	0.00%	1	227
Methylcyclohexane	0.769	98.19	14.00	46.00	2,800	0.0285	0.28%	0.48%	68	1178194
O-Xylene (1,2-Dimethylbenzene)	0.880	106.17	178.00	6.65	4	0.0000	0.00%	0.00%	1	243
Toluene	0.862	92.14	526.00	28.40	10	0.0001	0.00%	0.00%	10	2598
Molecular Weight (Given by the nominal molecular weight of C9-C18 aliphatics given that they comprise >85% of the NAPL; MADEP 2002) [g/mol]:						**170.00**				

Notes:

[1] Physiochemical properties for all VOC and VPH constituents were obtained from the U.S National Library of Medicine Toxicology Network (TOXNET) database and the Commonwealth of Massachusetts Executive Office of Environmental Affairs Department of Environmental Protection.

Composition based on non-aqueous phase liquid (NAPL) sample collected from MW-11A

HVE-01 NAPL composition is based on the NAPL sample collected from HVE-01 by ERM in June 2015.

g/cm^3 - grams per cubic centimeter

g/mol - grams per mol

mg/L - milligrams per Liter

mg/kg - milligrams per kilogram

mol/kg - mol per kilogram

µg/L - micrograms per Liter

mm Hg = millimeters of Mercury

µg/kg = micrograms per kilogram

$\mu g/m^3$ = micrograms per meters cubed

Equation for Maximum Potential Soil Gas Concentration from LNAPL Source calculations:

$C_{sg} = x_i \, vp_i \, MW_i \, conv / RT$

Where:

C_{sg} = maximum potential soil gas concentration of the constituent "i" from LNAPL volatization in $\mu g/m^3$;

x_i = mole fraction of constituent "i" in the LNAPL;

vp_i = pure phase vapor pressure of constituent "i" in the LNAPL in mmHg;

MW_i = molecular weight of constituent "i" in g/mol;

conv = conversion factor from g/L to ug/m3: 1,000,000,000

R = Ideal Gas Constant: 62.36367 L mmHg K^{-1} mol^{-1}

T = temperature: 298 K

Table 6-11
Effective Solubility Calculations (H-3P)
The Sherwin-Williams Company
Gibbsboro, New Jersey

Constituent	Pure-Phase Density (g/cm3)	Molecular Weight [1] (g/mol)	Pure-Phase Solubility (mg/L) (25 deg C)	Pure Phase Vapor Pressure (mm Hg) (25 deg C)	H-3P Concentration (mg/kg)	H-3P Concentration (mol/kg)	H-3P Percent Mass Fraction	H-3P Percent Mole Fraction	H-3P Estimated Effective Solubility (µg/L)	Maximum Potental Soil Gas Concentration from LNAPL Source (µg/m3)
Aliphatic Hydrocarbons										
C9 - C12		149.00	0.07	0.00087	790,000	5.3020	79.00%	90.13%	63	6287
Semivolatile Organic Compounds - TICs										
1,2,4,5-Tetramethylbenzene	0.868	134.22	3.48	1.06	6,100	0.0454	0.61%	0.77%	27	59148
1,3-Diethyl-5-Methylbenzene	0.865	148.27	8.81	1.00	5,400	0.0364	0.54%	0.62%	55	49396
Decahydro Naphthalene	0.897	138.25	0.89	2.30	4,300	0.0311	0.43%	0.53%	5	90468
M-Xylene (1,3-Dimethylbenzene)	0.870	106.17	161.000	8.29	6,600	0.0622	0.66%	1.06%	1,702	500495
O-Cymene (O-Isopropyltoluene)	0.877	134.22	23.30	1.50	4,400	0.0328	0.44%	0.56%	130	60373
Semivolatile Organic Compounds										
2-Methylnaphthalene	1.006	142.20	24.60	0.06	360	0.0025	0.04%	0.04%	11	181
Naphthalene	1.162	128.17	31.00	0.09	1,500	0.0117	0.15%	0.20%	62	1166
Volatile Organic Compounds -TICs										
1,2,3-Trimethyl Benzene	0.873	120.19	75.20	1.69	4,900	0.0408	0.49%	0.69%	521	75750
1,2,4,5-Tetramethylbenzene	0.868	134.22	3.48	0.53	5,000	0.0373	0.50%	0.63%	22	24149
1,2,4-Trimethylbenzene	0.876	120.19	57.00	2.10	9,500	0.0790	0.95%	1.34%	766	182492
1,3,5-Trimethylbenzene (Mesitylene)	0.864	120.19	48.20	2.48	7,500	0.0624	0.75%	1.06%	511	170143
Cis-1,3-Dimethyl Cyclohexane	0.784	112.21	11.70	21.50	6,900	0.0615	0.69%	1.05%	122	1357027
1,4-Diethyl Benzene[2]	0.862	134.22	24.80	1.06	7,700	0.0574	0.77%	0.98%	242	74662
2-Ethyl-1,4-Dimethyl Benzene	0.868	134.22	14.60	0.94	5,500	0.0410	0.55%	0.70%	102	47242
M-Cymene	0.861	134.22	42.50	1.72	12,000	0.0894	1.20%	1.52%	646	188804
Volatile Organic Compounds										
Benzene	0.876	78.11	1790.00	94.80	100	0.0013	0.01%	0.02%	390	86718
Cyclohexane	0.778	84.16	55.00	96.90	140	0.0017	0.01%	0.03%	16	124095
Ethylbenzene	0.863	106.47	170.00	9.60	4,400	0.0413	0.44%	0.70%	1,194	386389
Isopropylbenzene (Cumene)	0.862	120.19	61.30	4.50	660	0.0055	0.07%	0.09%	57	27168
M,P-Xylene	0.870	106.17	161.00	8.29	19,000	0.1790	1.90%	3.04%	4,898	1440818
Methylcyclohexane	0.769	98.19	14.00	46.00	2,100	0.0214	0.21%	0.36%	51	883646
O-Xylene (1,2-Dimethylbenzene)	0.880	106.17	178.00	6.65	50	0.0005	0.01%	0.01%	14	3042
Toluene	0.862	92.14	526.00	28.40	15	0.0002	0.00%	0.00%	15	3897
Molecular Weight (Given by the nominal molecular weight of C9-C18 aliphatics given that they comprise >85% of the NAPL; MADEP 2002) [g/mol]:						**170.00**				

__Notes:__

[1] Physiochemical properties for all VOC and VPH constituents were obtained from the U.S National Library of Medicine Toxicology Network (TOXNET) database and the Commonwealth of Massachusetts Executive Office of Environmental Affairs Department of Environmental Protection.

[2] Solubility @ 20 deg C

Composition based on non-aqueous phase liquid (NAPL) sample collected from MW-11A

HVE-01 NAPL composition is based on the NAPL sample collected from HVE-01 by ERM in June 2015.

g/cm^3 - grams per cubic centimeter

g/mol - grams per mol

mg/L - milligrams per Liter

mg/kg - milligrams per kilogram

mol/kg - mol per kilogram

µg/L - micrograms per Liter

mm Hg = millimeters of Mercury

µg/kg = micrograms per kilogram

$\mu g/m^3$ = micrograms per meters cubed

Equation for Maximum Potential Soil Gas Concentration from LNAPL Source calculations:

$C_{sg} = x_i\ vp_i\ MW_i\, conv / RT$

Where:

C_{sg} = maximum potential soil gas concentration of the constituent “i” from LNAPL volatization in $\mu g/m^3$;

x_i = mole fraction of constituent “i” in the LNAPL;

vp_i = pure phase vapor pressure of constituent “i” in the LNAPL in mmHg;

MW_i = molecular weight of constituent “i” in g/mol;

conv = conversion factor from g/L to ug/m3: 1,000,000,000

R = Ideal Gas Constant: 62.36367 L mmHg K^{-1} mol^{-1}

T = temperature: 298 K

Table 6-12
Soil Saturation Limit Calculations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Analyte	Solubility in Water (mg/L)	Soil Organic Carbon/Water Partition Coefficient (L/kg)	Henry's Law Constant (Dimensionless)	Calculated Soil Saturation Limit (mg/kg)	Mole Fraction (H-3P value)	Effective Soil Saturation Limit [All soils] (mg/kg)
C9 - C12 Aliphatics	7.00E-02	1.50E+05	6.50E+01	14	90.13%	12.70
Benzene	1.79E+03	1.46E+02	2.27E-01	765	0.00%	0.01
Cyclohexane	5.50E+01	1.46E+02	6.13E+00	61	0.03%	0.02
Ethylbenzene	1.69E+02	4.46E+02	3.22E-01	140	0.00%	0.00
Isopropylbenzene (Cumene)	6.13E+01	6.98E+02	4.70E-01	72	0.04%	0.03
M,P-Xylene	1.61E+02	3.75E+02	2.82E-01	117	0.00%	0.00
Methylcyclohexane	1.40E+01	1.06E+03	1.76E+01	51	0.48%	0.25
O-Xylene (1,2-Dimethylbenzene)	1.78E+02	3.83E+02	2.12E-01	130	0.00%	0.00
Toluene	5.26E+02	2.34E+02	2.71E-01	287	0.00%	0.01
2-Methylnaphthalene	2.46E+01	2.48E+03	2.12E-02	84	0.02%	0.01
Naphthalene	3.10E+01	1.54E+03	1.80E-02	68	0.01%	0.00

Equation

$$C_{sat} = \frac{S}{\rho_b}\left(K_d\,\rho_b + \theta_w + H'\,\theta_a\right)$$

Using Effective Solubility Values: Cesat = Mole Fraction x cSat

Where:	Shallow Zone	Units	Notes
cSat: Soil Saturation Limit	Calculated Above	mg/kg	See equation above
c_{eSat}: Effective Soil Saturation Limit	Calculated Above Based on Lowest cSat value for each soil layer	mg/kg	See equation above
S: Aqueous Solubility	Chemical Specific	mg/L	Literature Value
Sw: Effective Solubility	Calculated using NAPL chemical data from MW-11A and H-3P	mg/L	Site-specific value
Kd: Soil Distribution Coefficient	Chemical Specific	L/kg	Calculation: Kd = Koc x foc
H': Henry's Law Constant	Chemical Specific	Unitless	Literature Value
Koc: Soil Organic Carbon/Water Partition Coefficient	Chemical Specific	L/kg	Literature Value
foc: Fraction Organic Carbon Content in Soil	0.00129	Unitless mass ratio	Average value from 2017 data
θ_g: Moisture Content (Gravimetric Water Content)	0.21	Unitless mass ratio	Average value from 2017 data
θ_w: Volumetric Water Content	0.2982	Unitless volumetric ratio	Calculation: $\theta_w = \rho_b \times \theta_g / \rho_w$
θ_a: Volumetric Air Content	0.1618	Unitless volumetric ratio	Calculation: $\theta_a = \eta - \theta_w$
ρ_w: Density of Water	1	kg/L	Value at 25 °C
ρ_b: Dry Soil Bulk Density	1.4	kg/L	Average value from 2017 data
η: Total Soil Porosity	0.46	Unitless volumetric ratio	Average value from 2017 data

(https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-june-2017),U.S National Library of Medicine Toxicology Network (TOXNET) database, and the Commonwealth of Massachusetts Executive Office of Environmental Affairs Department of Environmental Protection.

Table 6-13
Summary of Lines of Evidence Supporting LNAPL Extent
The Sherwin-Williams Company
Gibbsboro, New Jersey

Location ID	Petrophysical Sample ID	Investigation Area	LNAPL Mass Estimate Sub-Area	NAPL Pore Fluid Saturation (%pv)	Associated Soil Screening PID Result (ppm)	Nearby MIP Location	Nominal MIP/PID Response Peak Interval(1) (ft bgs)	Associated EPH Concentration(2) (mg/kg)
DP-1	DP-1 (15.3'-16.0')	H	3	4.7	1,046	--	2	89
DP-2	DP-2 (12.0'-12.6')	H	3	3.9	1,740	CPT-MIP-22	4.5	2,200
DP-3	NS	H	3	NS	1,425	--	5.5	NS
DP-4	DP-4 (13.5'-14.2')	H	3	4.8	2,938	--	4	2,500
DP-5	DP-5 (11.5'-12.2')	H	3	7.4	1,622	--	2.5	290
DP-6	NS	H	3	NS	7	--		NS
DP-8	DP-8 (12.0'-12.7')	D	1	2.0	67	CPT-MIP-04	0.6	2
DP-9	DP-9 (8.0'-8.8')	D	1	3.5	1,200	CPT-MIP-08	0.6	410
DP-13	DP-13 (2.2'-3.0')	K	2	2.2	1,250	CPT-MIP-16	1.75	1,500
DP-13	DP-13 (6.5'-7.2')	K	2	4.3	17	CPT-MIP-16	1.75	2
DP-14	DP-14 (6.8'-7.5')	K	2		1,500	CPT-MIP-16	1.75	470
DP-14	DP-14 (13.5'-14.2')	K	2	2.2	12	CPT-MIP-16	1.75	2
DP-15	DP-15 (6.8'-7.4')	B	1	3.0	1,200	CPT-MIP-18	8	170
DP-15	DP-15 (11.0'-11.7')	B	1	1.1	70	CPT-MIP-18	8	NS
DP-16	DP-16 (3.3'-4.0')	K	2	2.4	100	CPT-MIP-15	1.75	2,400
DP-17	DP-17 (1.9'-2.5')	E	2	3.8	280	CPT-MIP-19	2.5	110
DP-17	DP-17 (3.0'-3.6')	E	2	4.3	1,500	CPT-MIP-19	2.5	NS
DP-17	DP-17 (4.4'-5.0')	E	2	1.9	3	CPT-MIP-19	2.5	34
DP-18	DP-18 (3.5'-4.2')	E	2	5.1	590	CPT-MIP-21	2.5	2
DP-18	DP-18 (6.5'-7.2')	E	2	0.7	2	CPT-MIP-21	2.5	2
DP-20	DP-20 (6.2'-6.8')	F	2	6.1	1,525	CPT-MIP-25	1.9	1,100
DP-20	DP-20 (8.0'-8.8')	F	2	3.3	1,003	CPT-MIP-25	1.9	2
DP-21	DP-21 (10.7'-11.2')	A	1	5.5	2,073	CPT-MIP-26	8	300
DP-21	DP-21 (11.2'-11.7')	A	1	1.7	2,567	CPT-MIP-26	8	630
DP-21	DP-21 (14.0'-14.6')	A	1	5.0	615	CPT-MIP-26	8	2
DP-21	DP-21 (16.9'-17.3')	A	1	1.0	19	CPT-MIP-26	8	NS
DP-22	DP-22 (7.3'-8.0')	A	1	1.4	385	CPT-MIP-27	8	130
DP-22	DP-22 (11.3'-12.0')	A	1	8.7	1,023	CPT-MIP-27	8	3,000
DP-22	DP-22 (13.5'-14.2')	A	1	8.3	1,340	CPT-MIP-27	8	2,100
DP-22	DP-22 (17.7'-18.3')	A	1	1.5	530	CPT-MIP-27	8	52
DP-22	DP-22 (20.5'-21.0')	A	1	4.8	17.3	CPT-MIP-27	8	NS
DP-23	DP-23 (11.0'-11.7')	J	3	2.2	680	CPT-MIP-32	3.5	2,100
DP-23	DP-23 (14.0'-14.7')	J	3	3.6	2,600	CPT-MIP-32	3.5	81
DP-23	DP-23 (16.0'-16.7')	J	3	0.1	12	CPT-MIP-32	3.5	2
DP-24	DP-24 (13.5'-14.2')	J	3	3.6	1,200	CPT-MIP-34	3.5	1,300
DP-24	DP-24 (17.0'-17.5')	J	3	0.3	7	CPT-MIP-34	3.5	2

Notes:

(1) = PID readings from boring logs used for Investigation Area H locations in place of MIP responses where MIP was not conducted.

(2) = EPH values in gray font were below laboratory detection limits.

%pv = percent pore volume

ppm = parts per million

ft bgs = feet below ground surface

mg/kg = milligrams per kilogram

NS = Not sampled

Table 7-3
Effective LNAPL Mobility Limit Concentration Calculations
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample/Area ID	Soil Porosity [η]	Fraction Residual NAPL [S_r]	NAPL Density [ρ_o]	Dry Bulk Density [ρ_s]	Residual NAPL Concentration [Cres,soil]
MW-11	0.4026	0.087	0.7923	1.4	19,822
H-3P	0.4026	0.087	0.942	1.4	23,568
Middle Distillates (Silt-Fine Sand)					22,857
Middle Distillates (Fine-Med Sand)					13,333
Gasoline (Silt-Fine Sand)					10,000
Gasoline (Fine-Med Sand)					5,833

$$C_{res,soil} = \left(\frac{\theta_o \cdot \rho_o}{\rho_s}\right) \cdot 10^6 \ \frac{mg}{kg}$$

Where:	Source of Data:
$C_{res,soil}$ = Residual NAPL concentration in soil (mg-res/kg-soil)	Calculation
$\theta_o = \eta \times S_r$ = Residual NAPL volume fraction (cm^3-res/cm^3-soil)	Calculation
ρ_o = Density of NAPL (g-res/cm^3-res)	MW-11 and H-3P 2017 samples (70 deg F)
ρs = Dry soil bulk density (g-soil/cm3-soil)	Average value of 2017 soil properties data
η = Soil porosity (cm^3-void/cm^3-soil)	Average value of 2017 soil properties data
S_r = Fraction of residual NAPL filled void (cm^3-res/cm^3-void)	0.087 = Max value of 2017 field saturation data

Table 8-4
Groundwater Biogeochemical Analytes, October 2017
The Sherwin-Williams Company
Gibbsboro, New Jersey

Screened Zone	Well ID	Functional Position	Biogeochemical Analytes (Concentrations Measured October 9-11, 2017)																		
			Field-Measured Analytes							Electron Acceptors (or Indicators)							Other Analytes		Non-Toxic Biogenic Gases	
			Dissolved Oxygen	ORP (Ag/AgCl)	pH	Spec. Cond.	Turbidity	Temperature	ΔT (relative to background)	DO	Nitrate (as N)	Nitrite (as N)	Mn^{2+}	Fe^{2+}	SO_4^{2-}	S^{2-}	Alkalinity (as CaCO3)	DOC	Methane (dissolved)	Carbon Dioxide (dissolved)
			mg/L	mV	s.u.	µS/cm	NTU	°C	°C	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Shallow	MW-SCAR	Background	0.2	-203	4	255	34	18	0	0.2	0.1 U	0.01 J	0.04	15	12	1 U	5 U	5	0.003 J	100
	MW-12	Source	0.8	-62	6	170	6	22	5	1	0.1 J	0.01 J	0.06	24	5 U	1 J	89	9	3.300	130
	MW-11	Source Distal	4.4	135	6	27	4	20	3	4	0.0 J	0.01 J	0.01 J	0.5	5 U	1 J	13	3	0.600	15
	MW-13R	Mid-Plume CL	0.1	-234	7	981	1	22	4	0.1	1 U	0.21 J	0.02	77	5 U	1 U	246	10	4.700	280
	MW-26	Mid-Plume E	0.1	-149	6	4,440	1	21	3	0.1	2 U	0.25 J	0.04	68	5 U	1 U	263	12	1.800	260
	MPMW-0009	Mid-Plume W	0.1	-116	6	3,220	1	26	8	0.1	2 U	0.27 J	0.24	41	9	1	521	24	2.800	520
	MW-03	Distal Plume CL	0.1	-285	7	1,312	1	19	1	0.1	0.3 J	0.19 J	0.38	65	5 U	1 U	106	12	0.940	130
Intermediate	MPMW-0003	Source	0.2	-135	6	193	6.2	19	0	0.2	2 U	0.19 J	0.1	26	6	1	72	2	0.550	62

Notes:

(1) Former Manufacturing Plant – Groundwater Technical Memorandum dated December 22, 2014 from Weston to USEPA.
mg/L - milligrams per Liter
mV= milliVolts
s.u. = in situ
µs/cm - micro Siemens per centirmeter
NTU - Nephelometric Turbidity Unit
°C= degrees celsius
U = The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Table 8-5
Microbial Results Summary, October 2017
The Sherwin-Williams Company
Gibbsboro, New Jersey

Sample Name (Well ID)	Water Bearing Zone	Bio-Trap Installation Date	Incubation Period (days)	Analyte Moniker	Result	Result Qualifier	Units	Analyte	Mechanism	Typical Metabolic Targets	Percentile[1] Rank in Lab Database (%)	Result[2] Interpretation (Potential for Target Degradation)	Abundance[3] Relative to Background (Result/ Background)	Abundance[4] Relative to Total Bacteria (%)
MW-SCAR	Shallow	10/12/2017	62	**EBAC**	**3,330,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	16	Low	1	100
MW-12	Shallow	10/12/2017	62	**EBAC**	**10,200,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	46	Moderate	3	100
MW-11	Shallow	10/12/2017	62	**EBAC**	**18,500,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	64	Moderate	6	100
MW-13R	Shallow	10/12/2017	62	**EBAC**	**1,680,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	4	Very Low	1	100
MW-26	Shallow	10/12/2017	62	**EBAC**	**4,650,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	24	Low	1	100
MPMW0009	Shallow	10/12/2017	62	**EBAC**	**18,400,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	64	Moderate	6	100
MW-3	Shallow	10/12/2017	62	**EBAC**	**2,180,000**	=	cells/bead	Total Eubacteria	All	Many Organic Compounds	8	Very Low	1	100
MPMW0009	Shallow	10/12/2017	62	**PM1**	**12**	=	cells/bead	*Methylibium petroliphilum PM1*	Aerobic	MTBE, TBA	6	Very Low	0.05	0.00
MW-3	Shallow	10/12/2017	62	**PM1**	**436**	=	cells/bead	*Methylibium petroliphilum PM1*	Aerobic	MTBE, TBA	6	Very Low	2	0.02
MW-12	Shallow	10/12/2017	62	**TOD**	**44,600**	=	cells/bead	Toluene/Benzene Dioxygenase	Aerobic	Aromatic Hydrocarbons	95	Very High	178	0.44
MPMW0009	Shallow	10/12/2017	62	**TOD**	**76,900**	=	cells/bead	Toluene/Benzene Dioxygenase	Aerobic	Aromatic Hydrocarbons	97	Very High	308	0.42
MW-26	Shallow	10/12/2017	62	**abcA**	**30,800**	=	cells/bead	Benzene Carboxylase	Anaerobic	Benzene		Moderate	123	0.66
MPMW0009	Shallow	10/12/2017	62	**abcA**	**133**	=	cells/bead	Benzene Carboxylase	Anaerobic	Benzene		Low	1	0.00
MW-12	Shallow	10/12/2017	62	**APS**	**15,300**	=	cells/bead	Sulfate-Reducing Bacteria	Anaerobic	Most Hydrocarbons	39	Moderate	61	0.15
MW-11	Shallow	10/12/2017	62	**APS**	**41,800**	=	cells/bead	Sulfate-Reducing Bacteria	Anaerobic	Most Hydrocarbons	48	Moderate	167	0.23
MW-13R	Shallow	10/12/2017	62	**APS**	**53,100**	=	cells/bead	Sulfate-Reducing Bacteria	Anaerobic	Most Hydrocarbons	50	Moderate	212	3
MW-13R	Shallow	10/12/2017	62	**BCR**	**1,070,000**	=	cells/bead	Benzoyl Coenzyme A Reductase	Anaerobic	Aromatic Hydrocarbons		Very High	4,280	64
MW-26	Shallow	10/12/2017	62	**BCR**	**322**	=	cells/bead	Benzoyl Coenzyme A Reductase	Anaerobic	Aromatic Hydrocarbons		Low	1	0.01

Notes:

1 "Percentile Rank" is a measure of microbial abundance relative to all other detected results in Microbial Insights laboratory's large database. The larger the rank value, the more the relative abundance of the analyte. For example, a percentile rank value of 65% implies that the result is greater than the result for 65% of other similar samples tested by Microbial Insights where the target was detected. Percentile rank estimates are based on Microbial Insight's database of more than 40,000 unique samples available with qPCR and QuantArray results for each particular target (e.g. EBAC) and sample type (e.g. water or Bio-Trap) at the time of testing. Percentile estimations for any given assay and sample type are based on detected results only (i.e., estimated values and values below detection limits were not considered). Similarly, the available data for each assay is a function of the date the assay was developed and the frequency at which the analysis is requested (i.e. percentile rankings are not available for recently developed assays and less commonly performed assays due to insufficient historical data to allow confident estimation).

2 "Interpretation" remarks are based on the following rationale:
A) If "Percentile Rank" is available, interpret 0% to 10% to be Very Low, 11% to 25% to be Low, 26% to 50% to be Moderate, 51% to 75% to be High, and >75% to be Very High.
B) For Analytes abcA, assA, BCR, BPH4, EDO, PHNA, RMO, TOD, and TOL: If "Percentile Rank" is unavailable, interpret results (cells/mL or cells/bead) <100 to be Very Low, 100 to 999 to be Low, 1,000 to 9,999 to be Moderate, 10,000 to 999,999 to be High, and >1,000,000 to be Very High.
C) For Analytes ALKB, ALMA, ANC, APS, bssA, EBAC, mnssA, NAH, NidA, PHE, and RDEG, : If "Percentile Rank" is unavailable, interpret results (cells/mL or cells/bead) <1,000 to be Very Low, 1,000 to 9,999 to be Low, 10,000 to 999,999 to be Moderate, 1.000,000 to 9,999,999 to be High, and >10,000,000 to be Very High.

3 "Abundance Relative to Background" is the ratio of the reported result relative to the corresponding value in the background sample. Reporting limit used where value is "<".

4 "Abundance Relative to Total Bacteria" is the ratio of the reported result relative to the corresponding value of EBAC in that sample, expressed as percent of EBAC. Reporting limit used where value is "<".

FIGURES

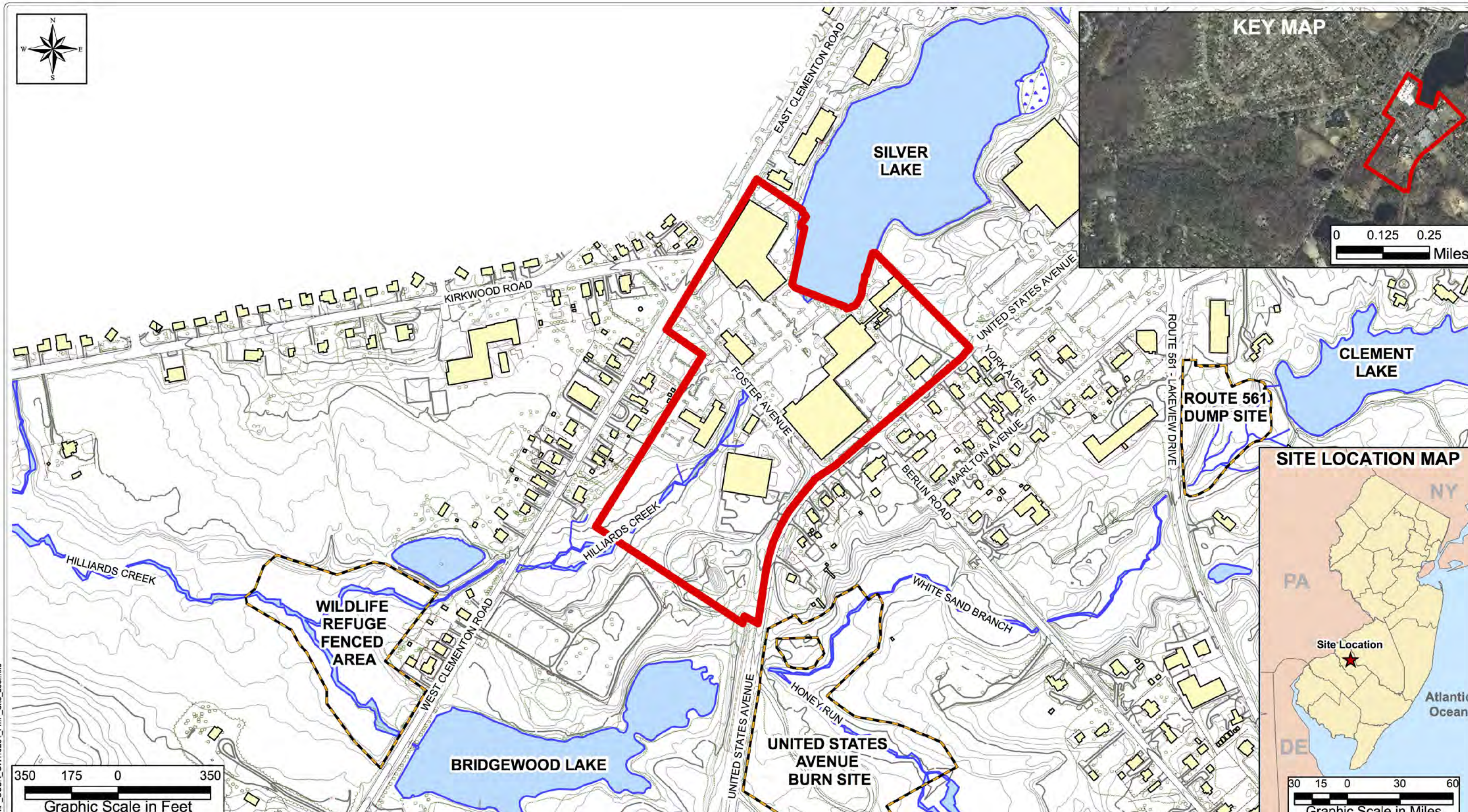


Figure Source:
Former Manufacturing Plant Groundwater Technical Memo
(Weston Solutions, December 2014.)

EHS Support consider it done	FORMER MANUFACTURING PLANT LNAPL CONCEPTUAL SITE MODEL THE SHERWIN-WILLIAMS COMPANY	SITE LOCATION MAP	FIGURE 1-1

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\103015\Fig 1-1 - Site Location Map - 103015.mxd

Printed 10/30/2015 1:01:43 PM by mhollinger

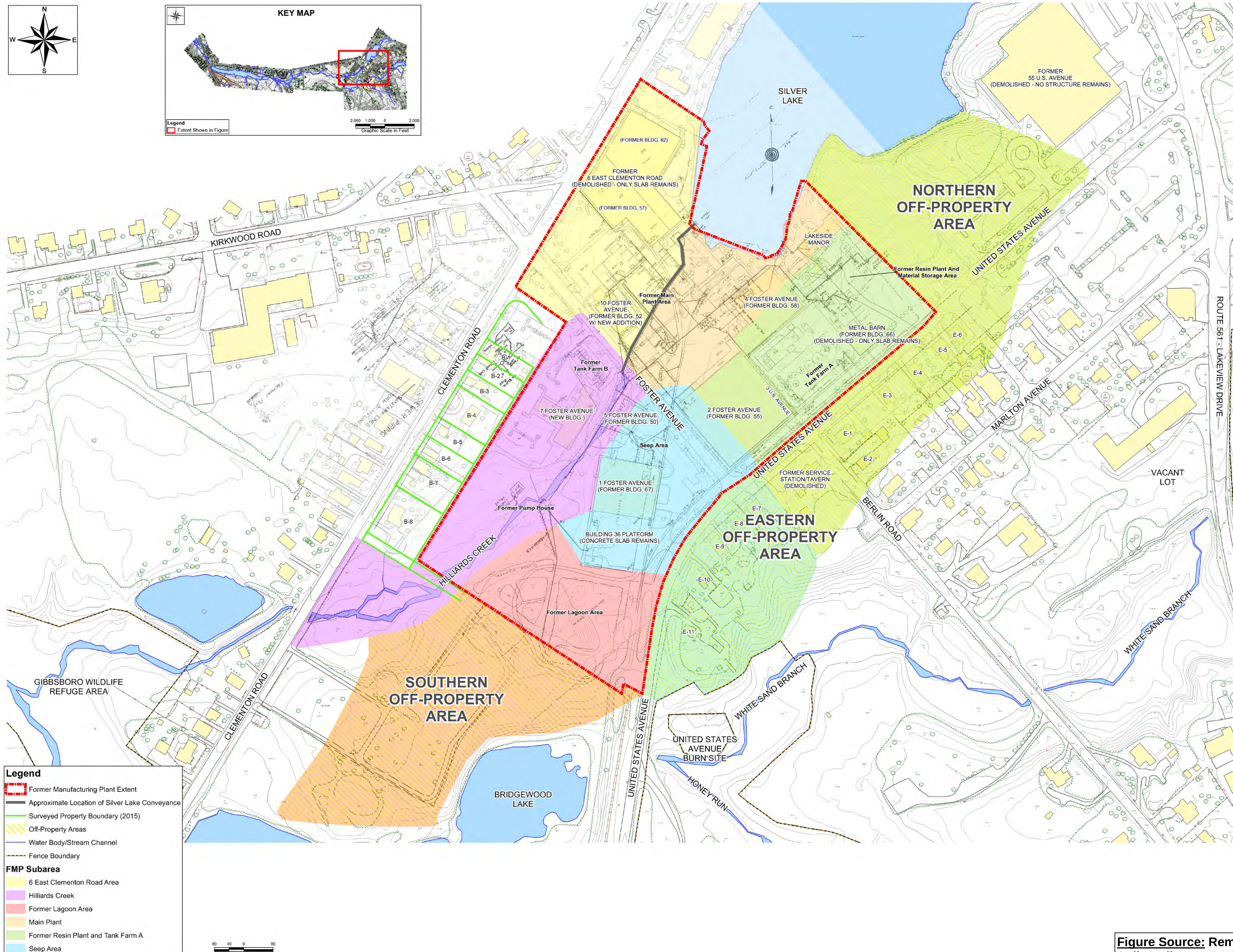


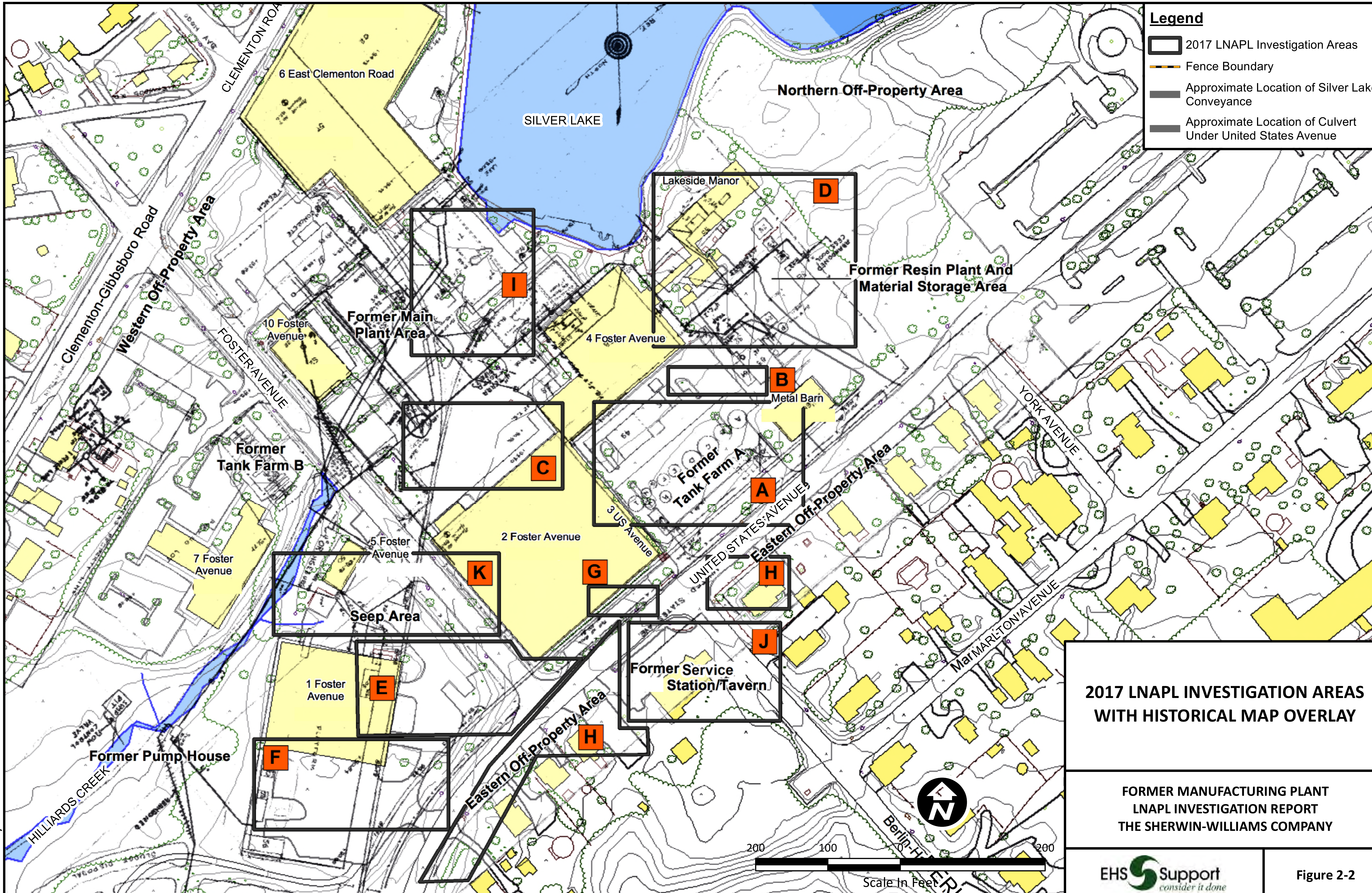
Figure Source: Remedial Investigation Report, Soil, Sediment, Surface Water, Pore Water and Vapor Intrusion, Sherwin-Williams/Hilliards Creek Superfund Site; Weston, 2018

EHS Support consider it done

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

FORMER MANUFACTURING PLANT
SUBAREA KEY MAP
WITH HISTORICAL OVERLAY

FIGURE 2-1



2017 LNAPL INVESTIGATION AREAS WITH HISTORICAL MAP OVERLAY

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

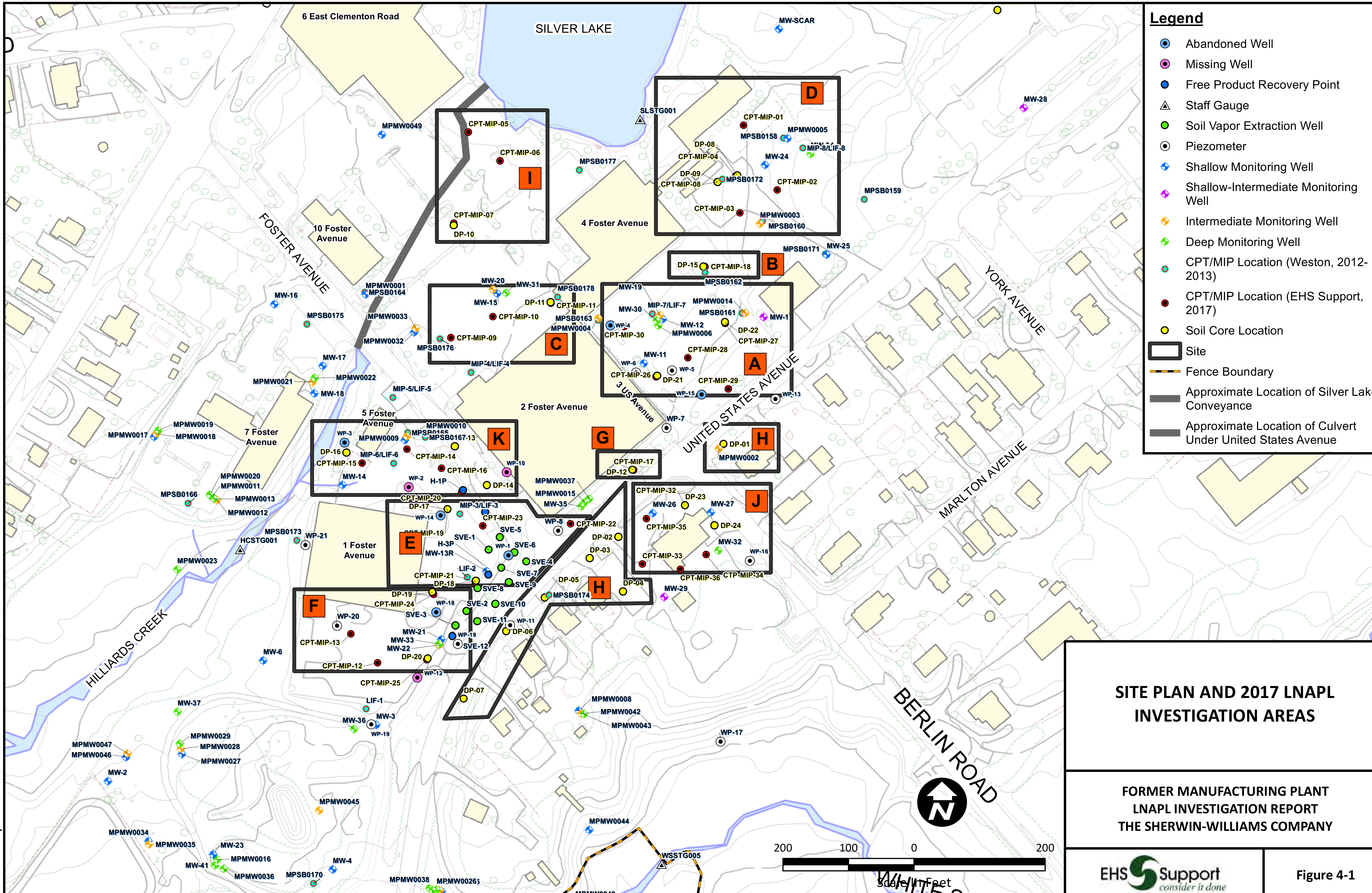
EHS Support consider it done

Figure 2-2

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReportSiteFigureSeries.mxd

Printed 3/7/2018 8:19:04 AM by Alex.Smith

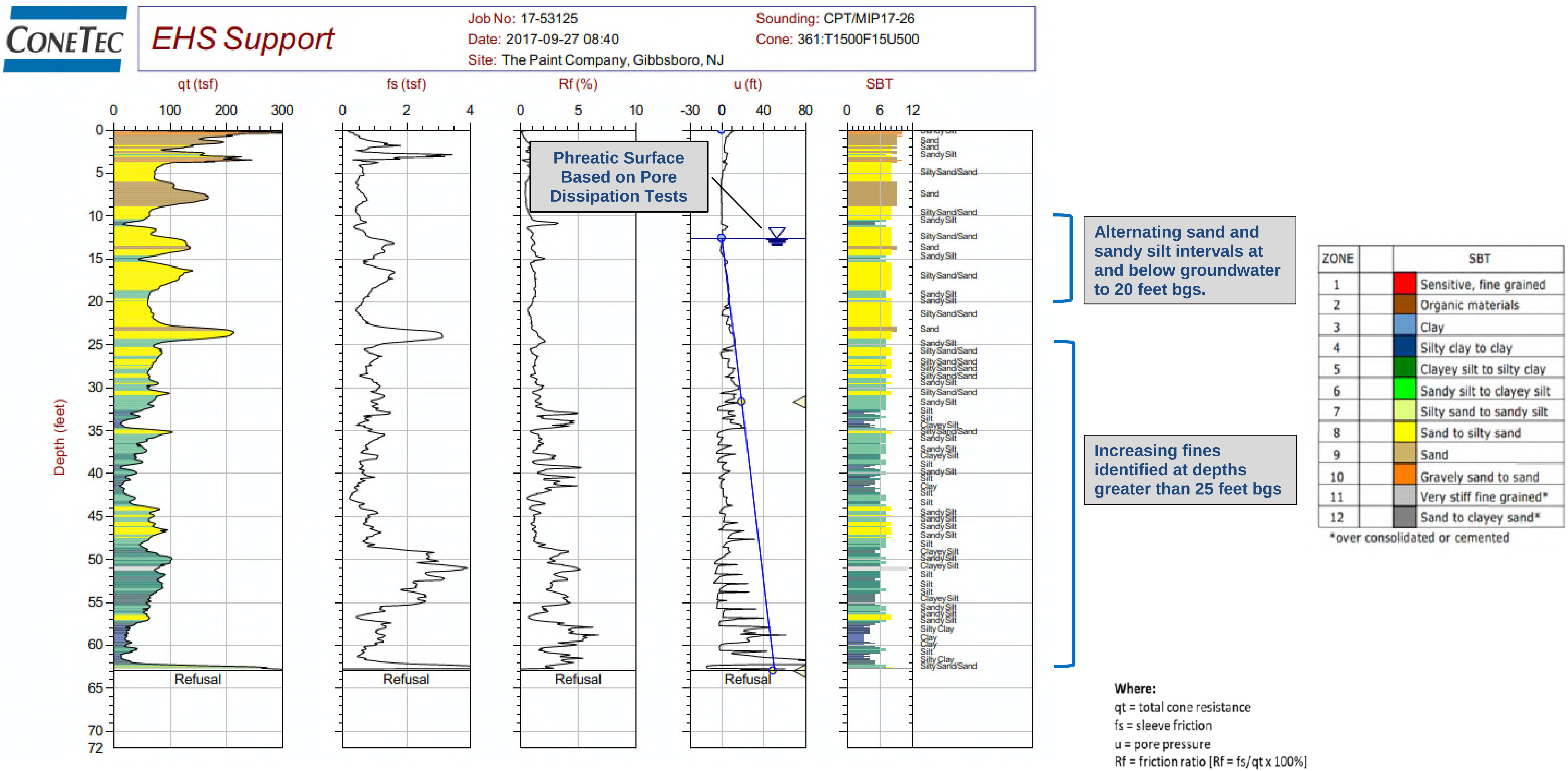


SITE PLAN AND 2017 LNAPL INVESTIGATION AREAS

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support consider it done

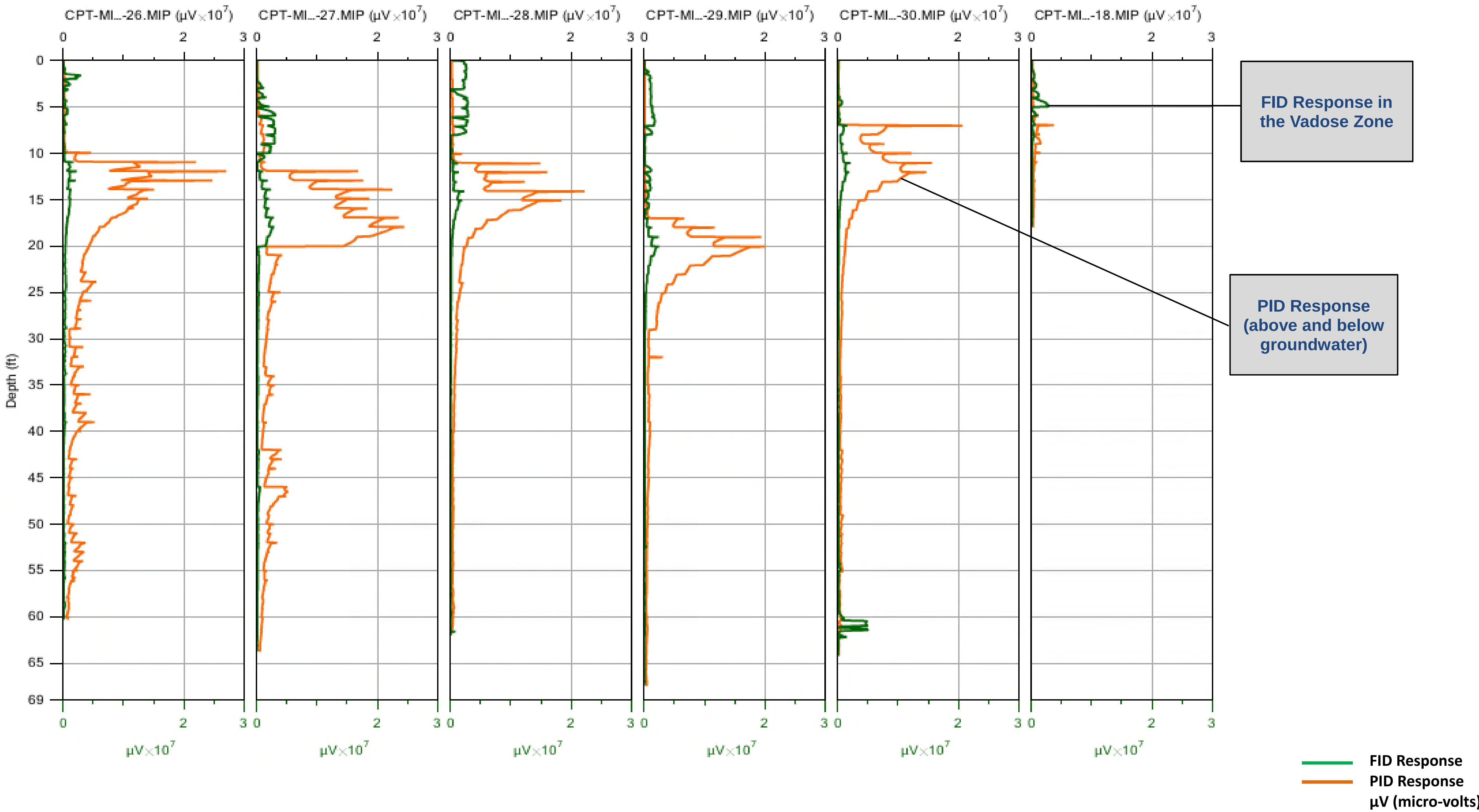
Figure 4-1



EHS Support consider it done

FIGURE 4-2
EXAMPLE CPT LOG FROM CPT/MIP-26

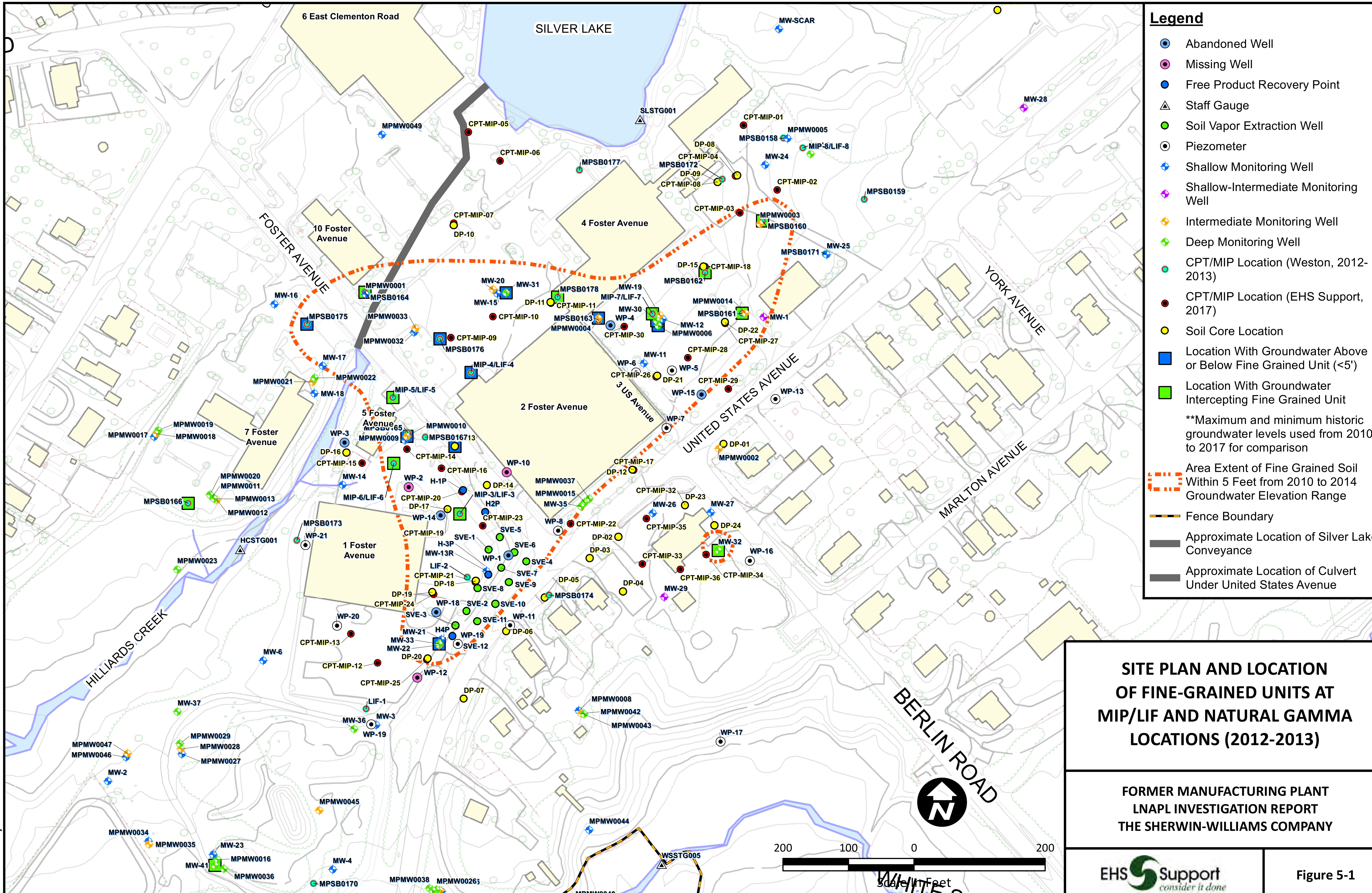
THE SHERWIN-WILLIAMS COMPANY
FORMER MANUFACRING PLANT, GIBBSBORO, NJ



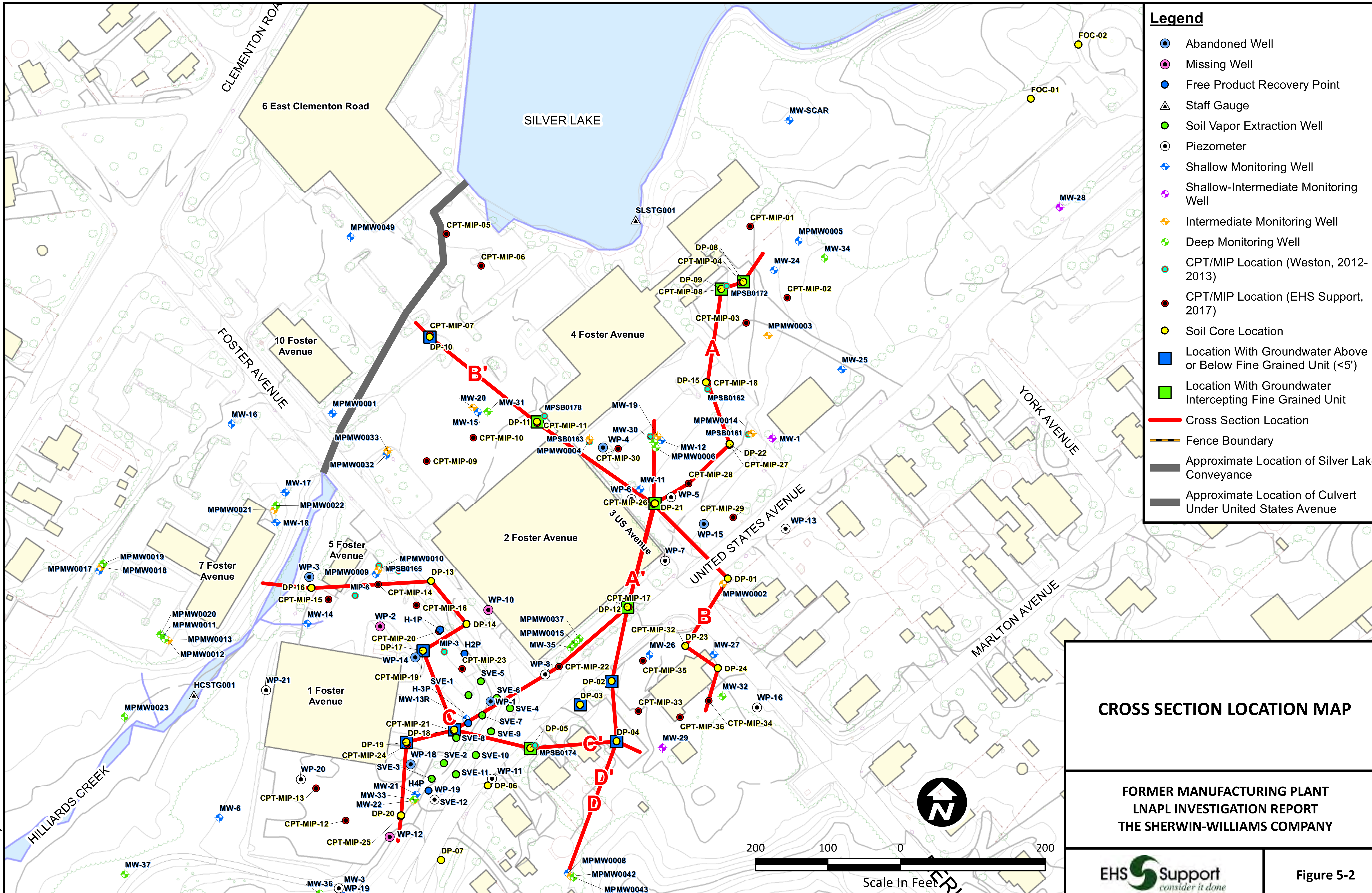
EHS Support
consider it done

FIGURE 4-3
EXAMPLE MIP LOG WITH INTERPRETATION

THE SHERWIN-WILLIAMS COMPANY
FORMER MANUFACRING PLANT, GIBBSBORO, NJ



Legend
Abandoned Well
Missing Well
Free Product Recovery Point
Staff Gauge
Soil Vapor Extraction Well
Piezometer
Shallow Monitoring Well
Shallow-Intermediate Monitoring Well
Intermediate Monitoring Well
Deep Monitoring Well
CPT/MIP Location (Weston, 2012-2013)
CPT/MIP Location (EHS Support, 2017)
Soil Core Location
Location With Groundwater Above or Below Fine Grained Unit (<5')
Location With Groundwater Intercepting Fine Grained Unit
**Maximum and minimum historic groundwater levels used from 2010 to 2017 for comparison
Area Extent of Fine Grained Soil Within 5 Feet from 2010 to 2014 Groundwater Elevation Range
Fence Boundary
Approximate Location of Silver Lake Conveyance
Approximate Location of Culvert Under United States Avenue
SILVER LAKE
6 East Clementon Road
10 Foster Avenue
4 Foster Avenue
2 Foster Avenue
7 Foster Avenue
5 Foster Avenue
1 Foster Avenue
3 US Avenue
FOSTER AVENUE
UNITED STATES AVENUE
YORK AVENUE
MARLTON AVENUE
BERLIN ROAD
HILLIARDS CREEK
SLSTG001
HCSTG001
WSSTG005
MW-SCAR
MW-28
MPMW0049
CPT-MIP-05
CPT-MIP-06
CPT-MIP-01
MPMW0005
MPSB0158
MIP-8/LIF-8
MPSB0177
MW-24
MPSB0172
CPT-MIP-02
MPSB0159
MPMW0003
MPSB0160
MW-25
MPSB0171
MPMW0001
MPSB0164
MPSB0175
MPMW0033
MPMW0032
MPSB0176
MPSB0178
MPSB0163
MPMW0004
MPSB0162
MPMW0014
MPSB0161
MPMW0006
MW-1
MW-16
MW-17
MPMW0021
MPMW0022
MW-18
MIP-4/LIF-4
MIP-5/LIF-5
MPMW0010
MPMW0009
MPSB016713
MPMW0019
MPMW0017
MPMW0018
MPMW0020
MPMW0011
MPMW0013
MPMW0012
MPSB0166
MPSB0173
MPMW0023
MPMW0037
MPMW0015
MW-35
MPMW0002
MW-32
MW-29
MPSB0174
MPMW0008
MPMW0042
MPMW0043
WP-17
MW-37
MW-36
MW-3
WP-19
MPMW0047
MPMW0046
MPMW0029
MPMW0028
MPMW0027
MW-2
MPMW0045
MPMW0044
MPMW0034
MPMW0035
MW-23
MPMW0016
MW-41
MPMW0036
MW-4
MPSB0170
MPMW0038
MPMW0040
200 100 0 200
Scale In Feet
SITE PLAN AND LOCATION OF FINE-GRAINED UNITS AT MIP/LIF AND NATURAL GAMMA LOCATIONS (2012-2013)
FORMER MANUFACTURING PLANT LNAPL INVESTIGATION REPORT THE SHERWIN-WILLIAMS COMPANY
EHS Support
consider it done
Figure 5-1
Reviewed By:
Printed 3/19/2018 4:38:14 PM by Alex.Smith



Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\SiteFigureSeries.mxd

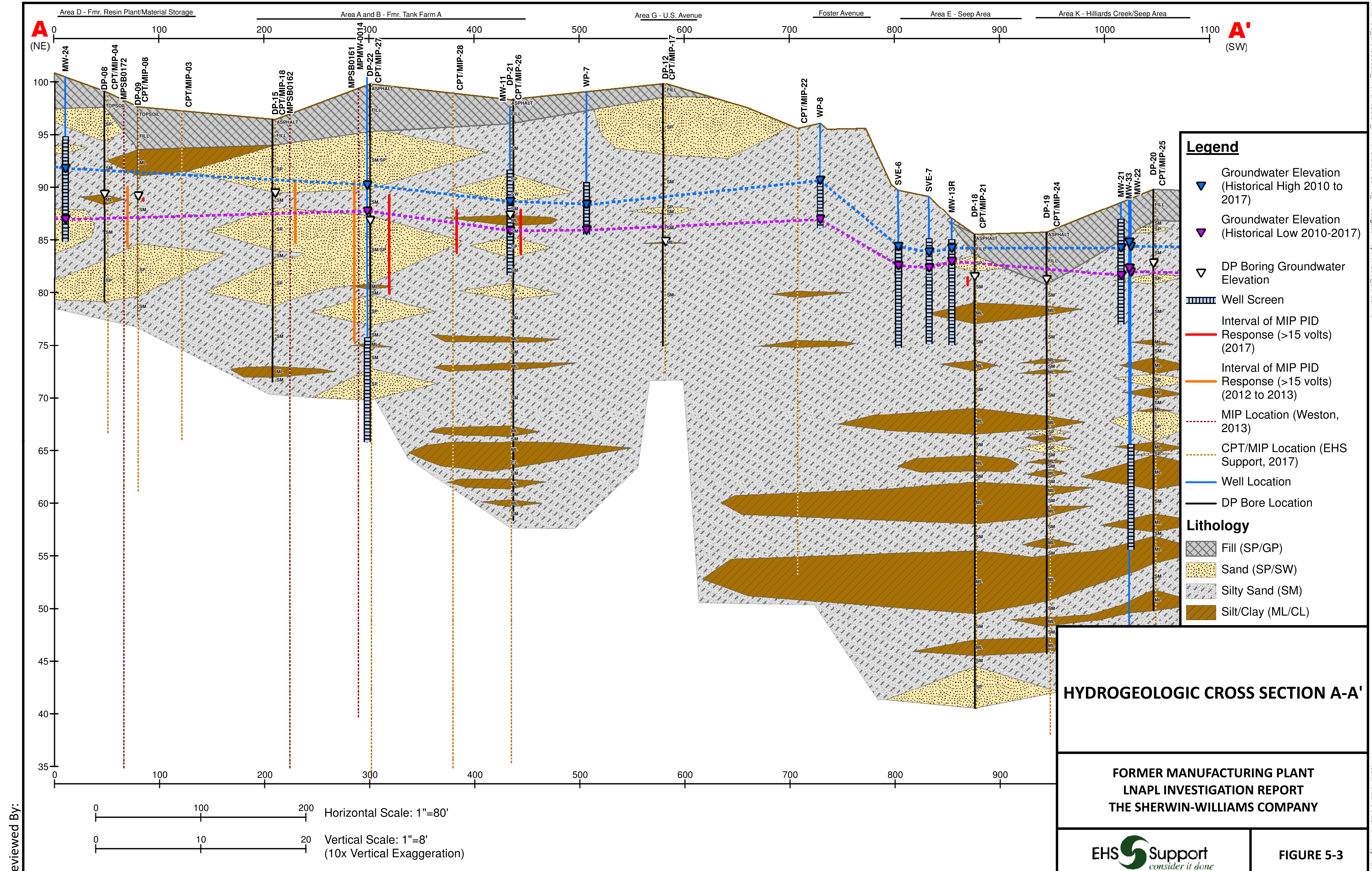
Printed 3/19/2018 4:38:33 PM by Alex.Smith

CROSS SECTION LOCATION MAP

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support
consider it done

Figure 5-2

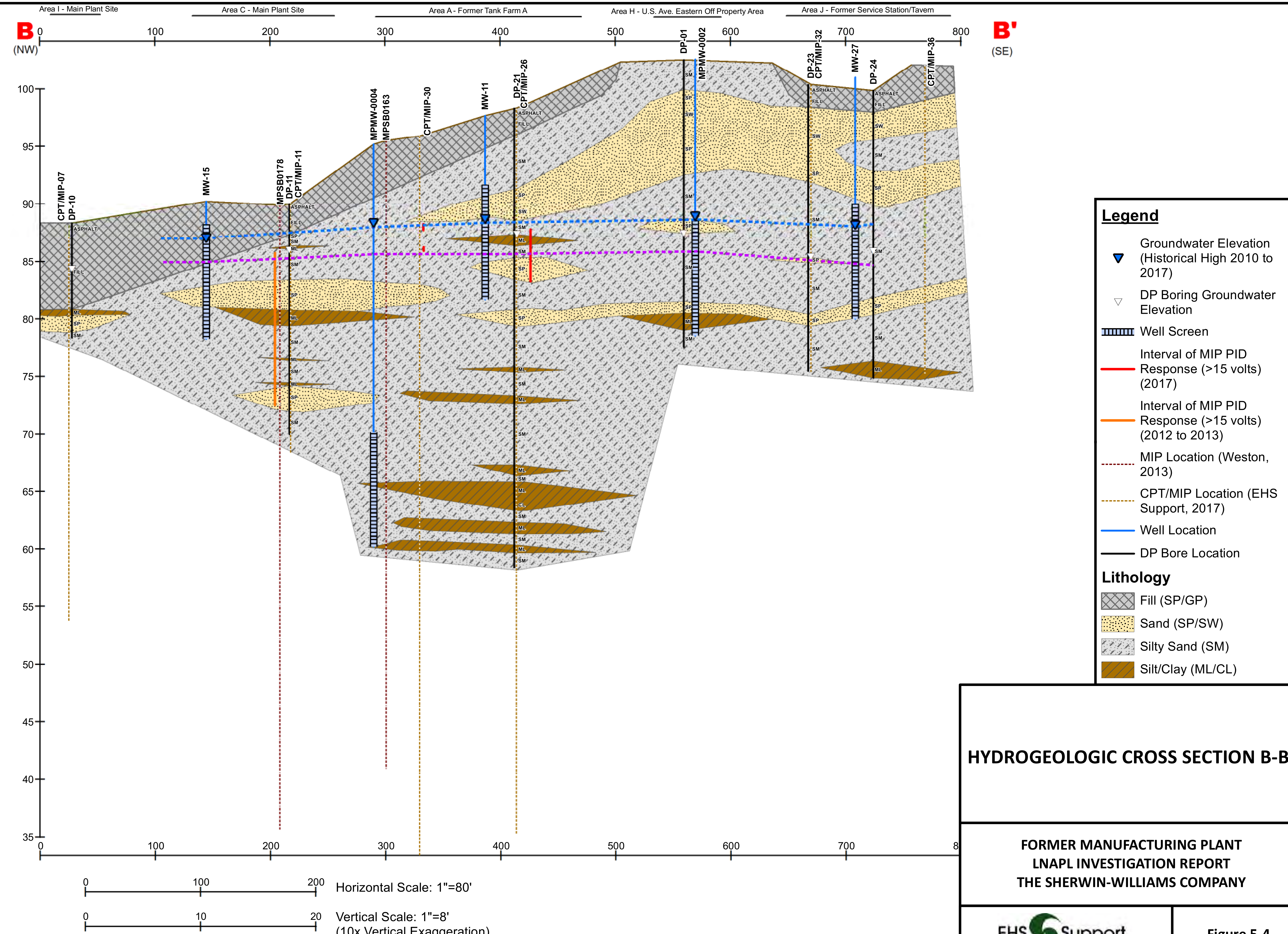


HYDROGEOLOGIC CROSS SECTION A-A'

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support *consider it done*

FIGURE 5-3



HYDROGEOLOGIC CROSS SECTION B-B'

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

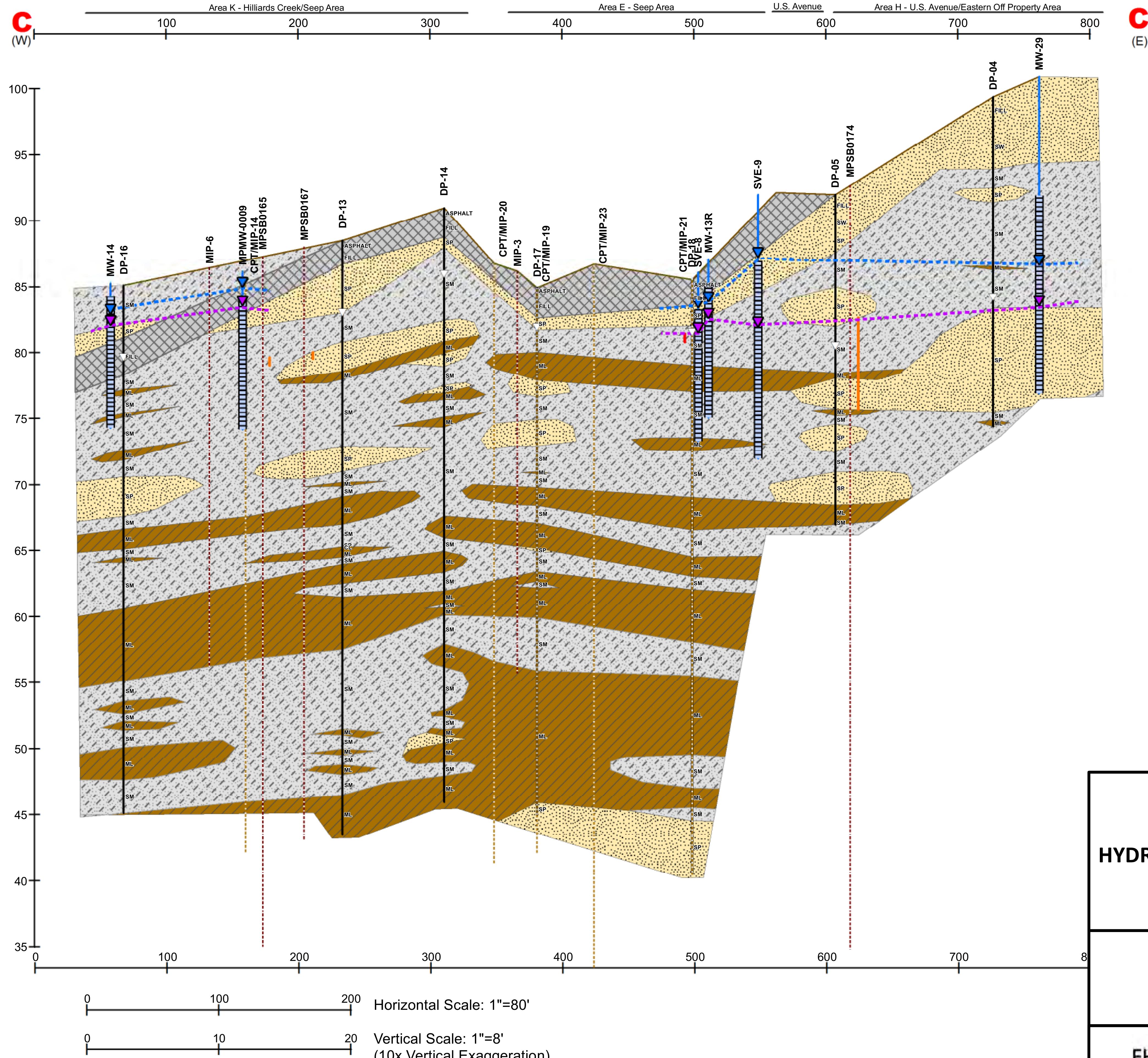
EHS Support consider it done

Figure 5-4

Reviewed By:

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Xsect_Series.mxd

Printed 2/16/2018 12:40:26 PM by ASmith



Legend

- Groundwater Elevation (Historical High 2010 to 2017)
- Groundwater Elevation (Historical Low 2010-2017)
- DP Boring Groundwater Elevation
- Well Screen
- Interval of MIP PID Response (>15 volts) (2017)
- Interval of MIP PID Response (>15 volts) (2012 to 2013)
- MIP Location (Weston, 2012-2013)
- CPT/MIP Location (EHS Support, 2017)
- Well Location
- DP Bore Location

Lithology

- Fill (SP/GP)
- Sand (SP/SW)
- Silty Sand (SM)
- Silt/Clay (ML/CL)

HYDROGEOLOGIC CROSS SECTION C-C'

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

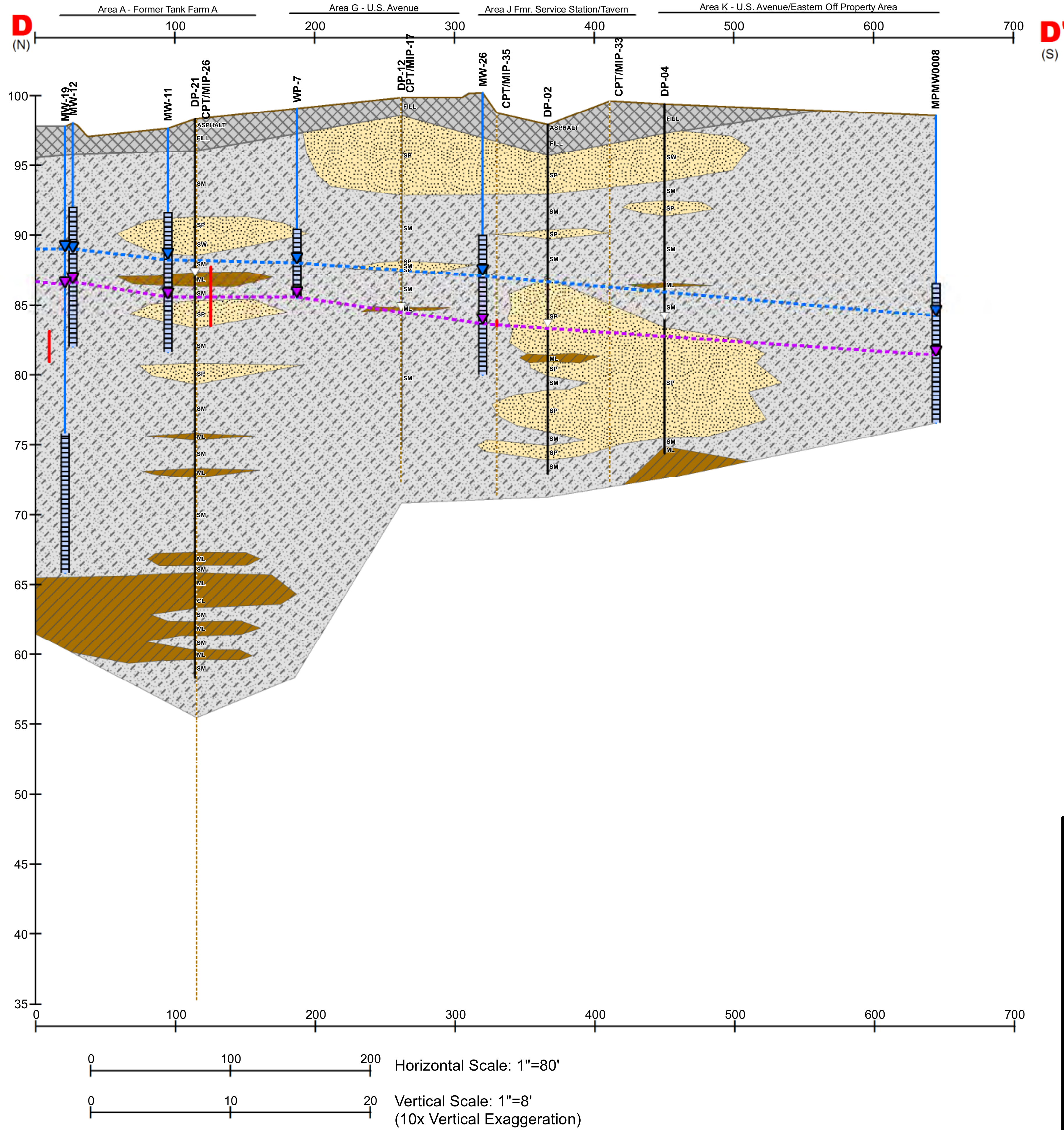
EHS Support
consider it done

Figure 5-5

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReportXsect_Series.mxd

Printed 2/15/2018 9:16:30 PM by ASmith

Reviewed By:



Legend

- Groundwater Elevation (Historical High 2010 to 2017)
- Groundwater Elevation (Historical Low 2010-2017)
- DP Boring Groundwater Elevation
- Well Screen
- Interval of MIP PID Response (>15 volts) (2017)
- MIP Location (Weston, 2012-2013)
- CPT/MIP Location (EHS Support, 2017)
- Well Location
- DP Bore Location

Lithology

- Fill (SP/GP)
- Sand (SP/SW)
- Silty Sand (SM)
- Silt/Clay (ML/CL)

HYDROGEOLOGIC CROSS SECTION D-D'

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support consider it done

Figure 5-6

Reviewed By:

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Xsect_Series.mxd

Printed 2/14/2018 4:45:38 PM by ASmith

DP-17 (Soil Core Photo)

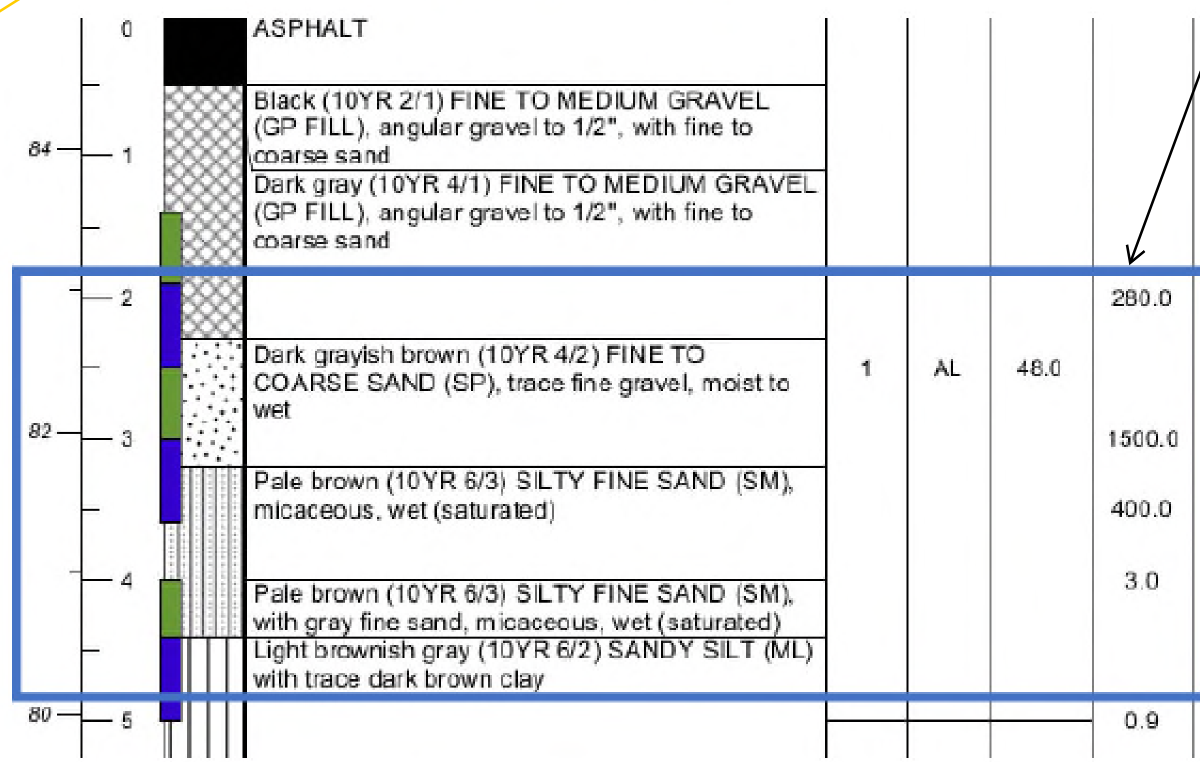
UV florescence

DP-17 (Soil Grain Size Results)

Soil Core Sample ID	Specific Sample Depth (feet bgs)	PTS Analytical Laboratory Results									
		Mean Grain Size Description USCS/ASTM	Median Grain Size mm	Particle Size Distribution, weight percent							
				Gravel	Sand Size			Silt	Clay	Silt/Clay
				Coarse	Coarse	Medium	Fine			
DP-17 (1.9'-2.5')	1.9-2.2	Gravel	4.160	48.16	12.38	18.20	16.76	NA	NA	4.49
DP-17 (3.0'-3.6')	3.0-3.3	Medium sand	0.606	5.27	9.02	51.64	29.41	NA	NA	4.66
DP-17 (4.4'-5.0')	4.4-4.6	Silt	0.080	0.00	0.00	0.00	56.20	30.23	13.58	43.80

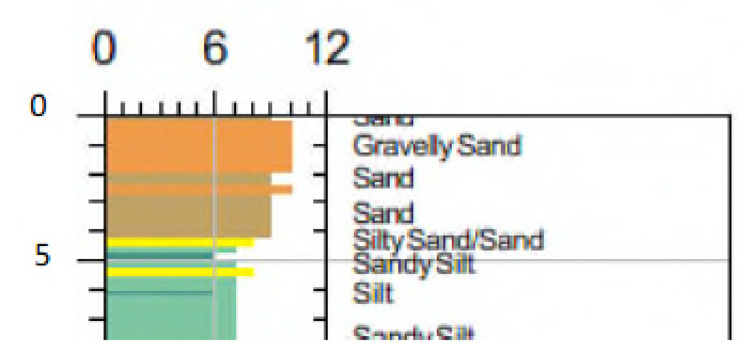
Silt corresponds to Sandy Silt noted in Soil Boring and CPT Logs below (~4.4 feet bgs).

DP-17 (Soil Boring Log)



Elevated PID response from boring log corresponds to UV florescence identified by soil core photography.

CPT/MIP-19



EHS Support consider it done

FIGURE 5-7
Soil Core Photograph, Soil Boring Log, and SBT Results
(Soil Core DP-17 and CPT/MIP-19 Locations)

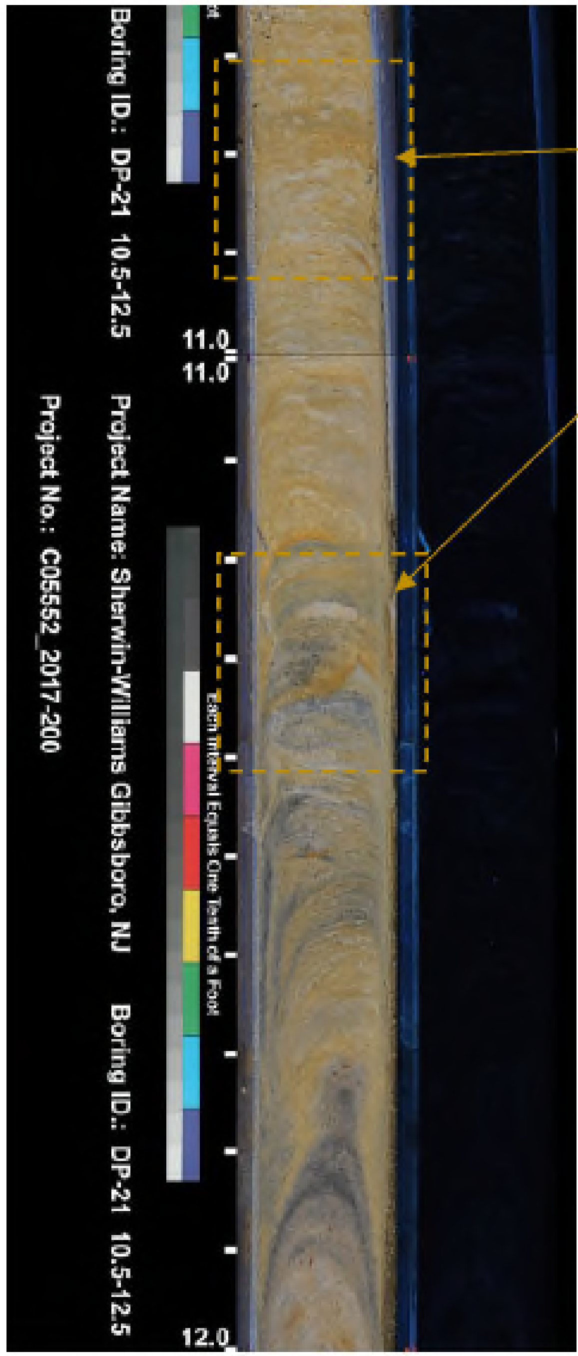
THE SHERWIN-WILLIAMS COMPANY
FORMER MANUFACRING PLANT, GIBBSBORO, NJ

DP-21 (Soil Grain Size Results)

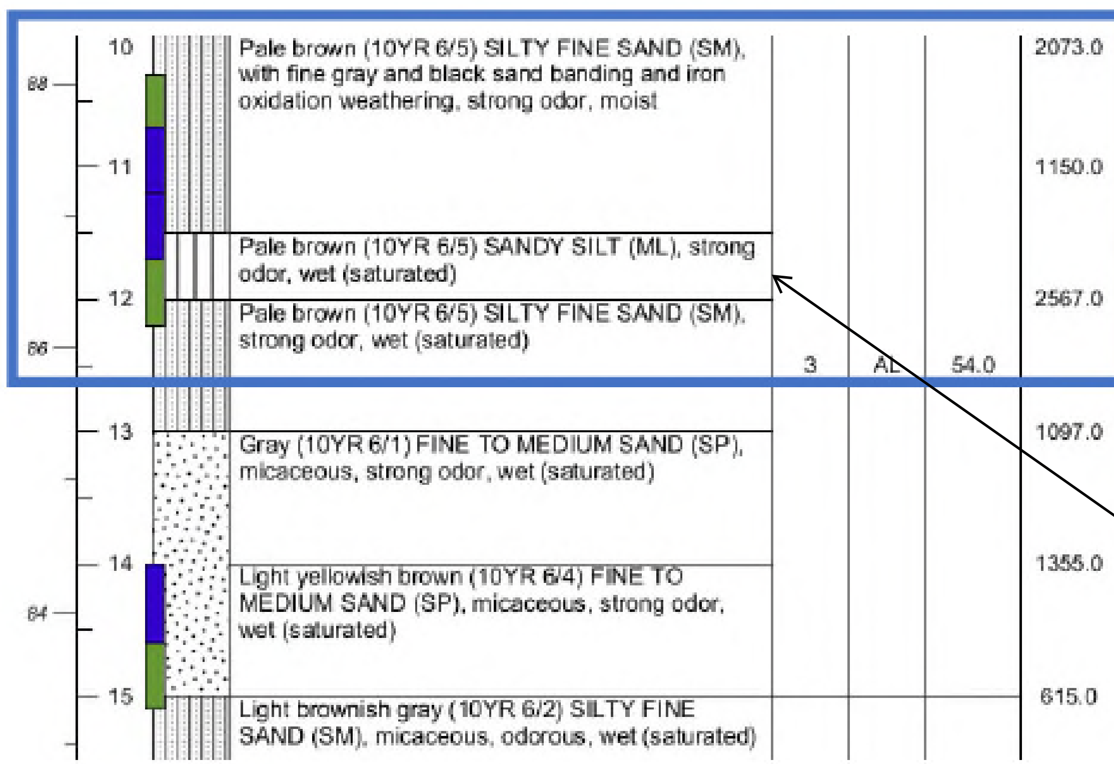
Soil Core Sample ID	Specific Sample Depth (feet bgs)	Mean Grain Size Description USCS/ASTM	Median Grain Size mm	PTS Analytical Laboratory Results						
				Particle Size Distribution, weight percent						
				Gravel	Sand Size			Silt	Clay	Silt/Clay
				Coarse	Coarse	Medium	Fine			
DP-21 (10.7'-11.2')	10.7-10.9	Fine sand	0.106	0.00	0.00	3.47	70.62	18.95	6.96	25.91
DP-21 (11.2'-11.7')	11.2-11.4	Fine sand	0.097	0.00	0.00	0.64	63.64	25.48	10.25	35.72

Fine Sands corresponds to CPT Log at similar interval.

DP-21 (Soil Core Photo)

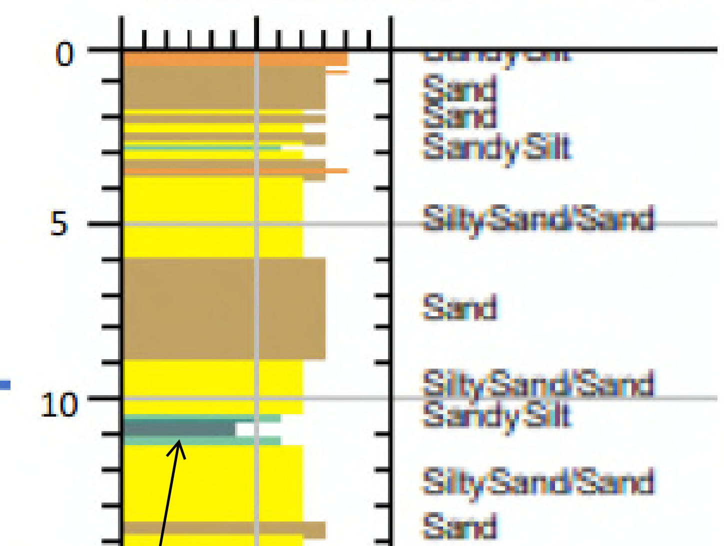


DP-21 (Soil Boring Log)



Sandy Silt corresponds to CPT Log (~11.5 feet bgs).

CPT/MIP-26 (0 to 15 ft bgs)

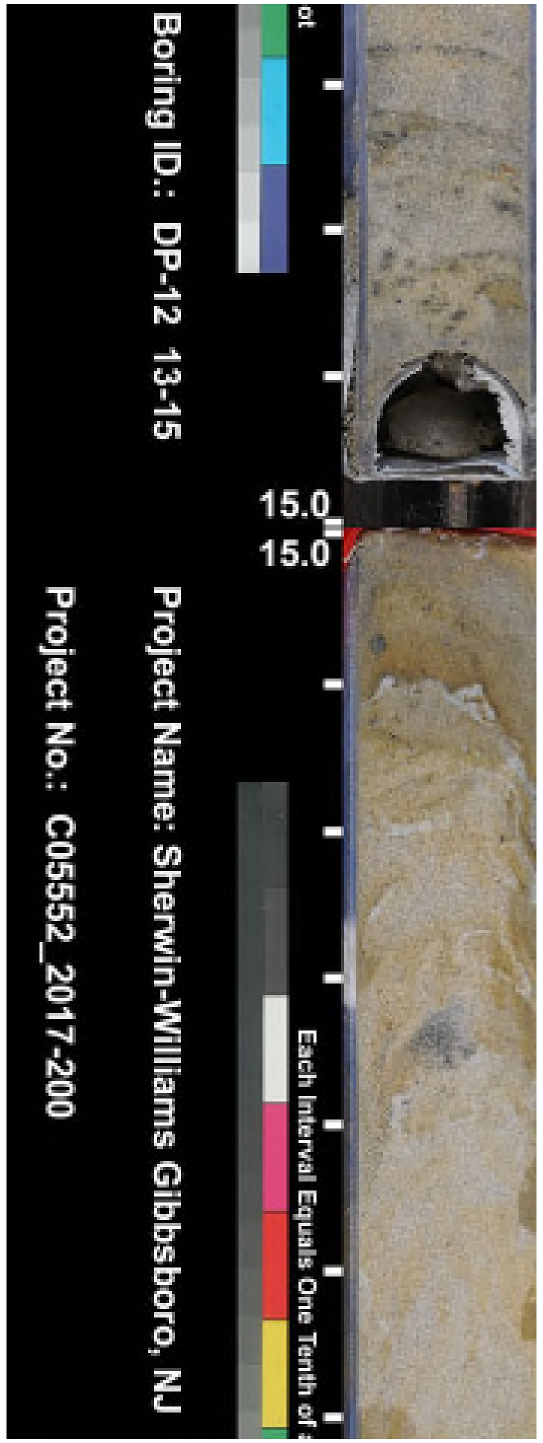


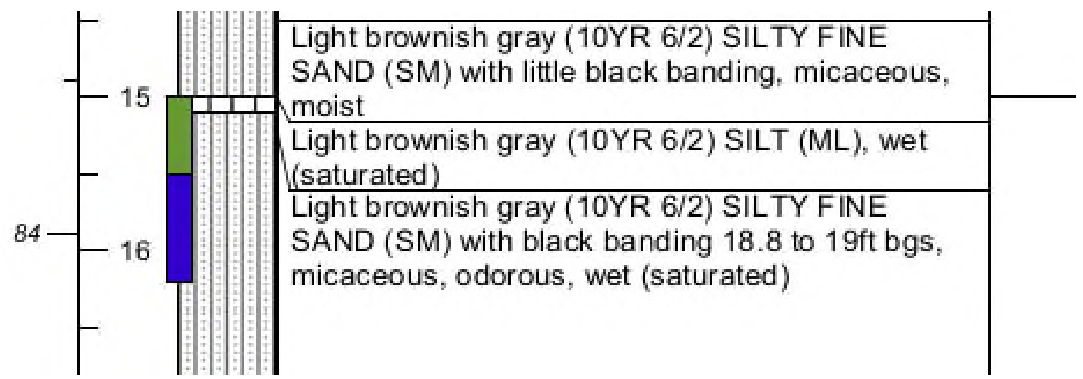
EHS Support consider it done	**FIGURE 5-8** **Soil Core Photograph, Soil Boring Log, and SBT Results** **(Soil Core DP-21 and CPT/MIP-26 Locations)**	**THE SHERWIN-WILLIAMS COMPANY** **FORMER MANUFACRING PLANT, GIBBSBORO, NJ**

DP-12 (Soil Core Photo)

DP-12 (Soil Boring Log)

CPT/MIP-17 (0 to 15 ft bgs)





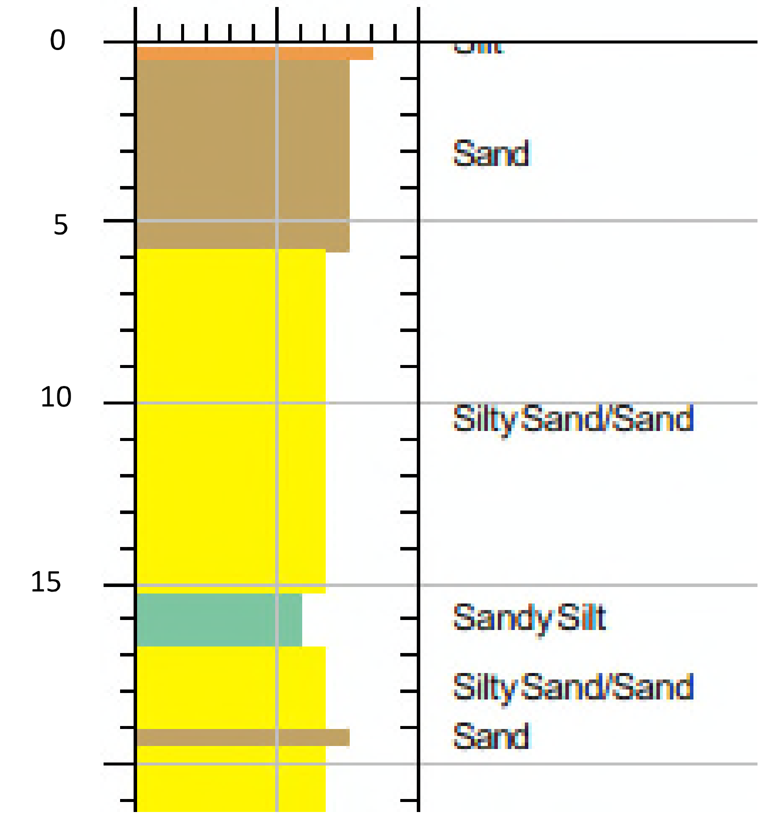


FIGURE 5-9
Soil Core Photograph, Soil Boring Log, and SBT Results
(Soil Core DP-12 and CPT/MIP-17 Locations)

EHS Support
consider it done

THE SHERWIN-WILLIAMS COMPANY
FORMER MANUFACRING PLANT, GIBBSBORO, NJ

Estimated Elevation[2] (feet MSL)	Estimated Thickness[2, 3] (feet)	Geologic Age	Geologic Unit[1]	Hydrogeologic Unit[1]	Approximate Well Screen Intervals	Hydraulic Conductivity[5] (ft/day)
110, 100, 90	< 30	Tertiary	Kirkwood Formation (lower)	Kirkwood- Cohansey aquifer system	Gibbsboro Site[4] Monitoring Wells	26 - 1
80, 70, 60, 50, 40	50	Tertiary	Kirkwood Formation (lower)	Composite confining unit	Gibbsboro Site[4] Monitoring Wells	13.9 - 0.1
30, 20, 10, sea level, 0	40	Tertiary	Vincentown Formation	Vincentown aquifer / Composite confining unit	Gibbsboro Site[4] Monitoring Wells	9.5 - 0.5
-10, -20	40	Tertiary	Hornerstown Sand	Composite confining unit		
-30, -40		Cretaceous	Navesink Formation	Composite confining unit		
-50, -60, -70, -80, -90, -100, -110	70	Cretaceous	Mount Laurel Sand & Wenonah Formation	Wenonah- Mount Laurel aquifer	Local Residential	
-120, -130, -140, -150	40	Cretaceous	Marshalltown Formation	Marshalltown-Wenonah confining bed		
-160	30	Cretaceous	Englishtown Formation	Englishtown aquifer system	Local Public Supply	
-190	150	Cretaceous	Woodbury Clay; Merchantville Formation	Merchantville-Woodbury confining bed		
-340	110	Cretaceous	Magothy Formation	Upper aquifer (Potomac-Raritan-Magothy aquifer)		
-450	50	Cretaceous	Raritan Formation	Confining bed (Potomac-Raritan-Magothy aquifer)		
-500	110	Cretaceous	Raritan Formation	Middle aquifer (Potomac-Raritan-Magothy aquifer)		
-610	150	Cretaceous	Potomac Group	Confining bed (Potomac-Raritan-Magothy aquifer)		
-760	240	Cretaceous	Potomac Group	Lower aquifer (Potomac-Raritan-Magothy aquifer)	Local Public Supply	
-1000	--	pre-Cret.	Bedrock	Bedrock confining bed		

Notes:

1. Unit names are consistent with Zapecza (1989)
2. Elevations and thicknesses estimated based on Zapecza (1989); specific locations may vary
3. Thickness of Kirkwood-Cohansey aquifer system includes vadose zone
4. Includes Hilliards Creek, Route 561 Dump Site, and United States Avenue Burn Site
5. Approximate range of hydraulic conductivity values from slug test data

Legend	
light blue	locally low to moderate permeability, functions as a confining unit
blue	major aquifer
yellow	confining unit

EHS Support consider it done

Figure 5-10
Geologic and Hydrogeologic Units
Sherwin-William Project Site
Gibbsboro, New Jersey –

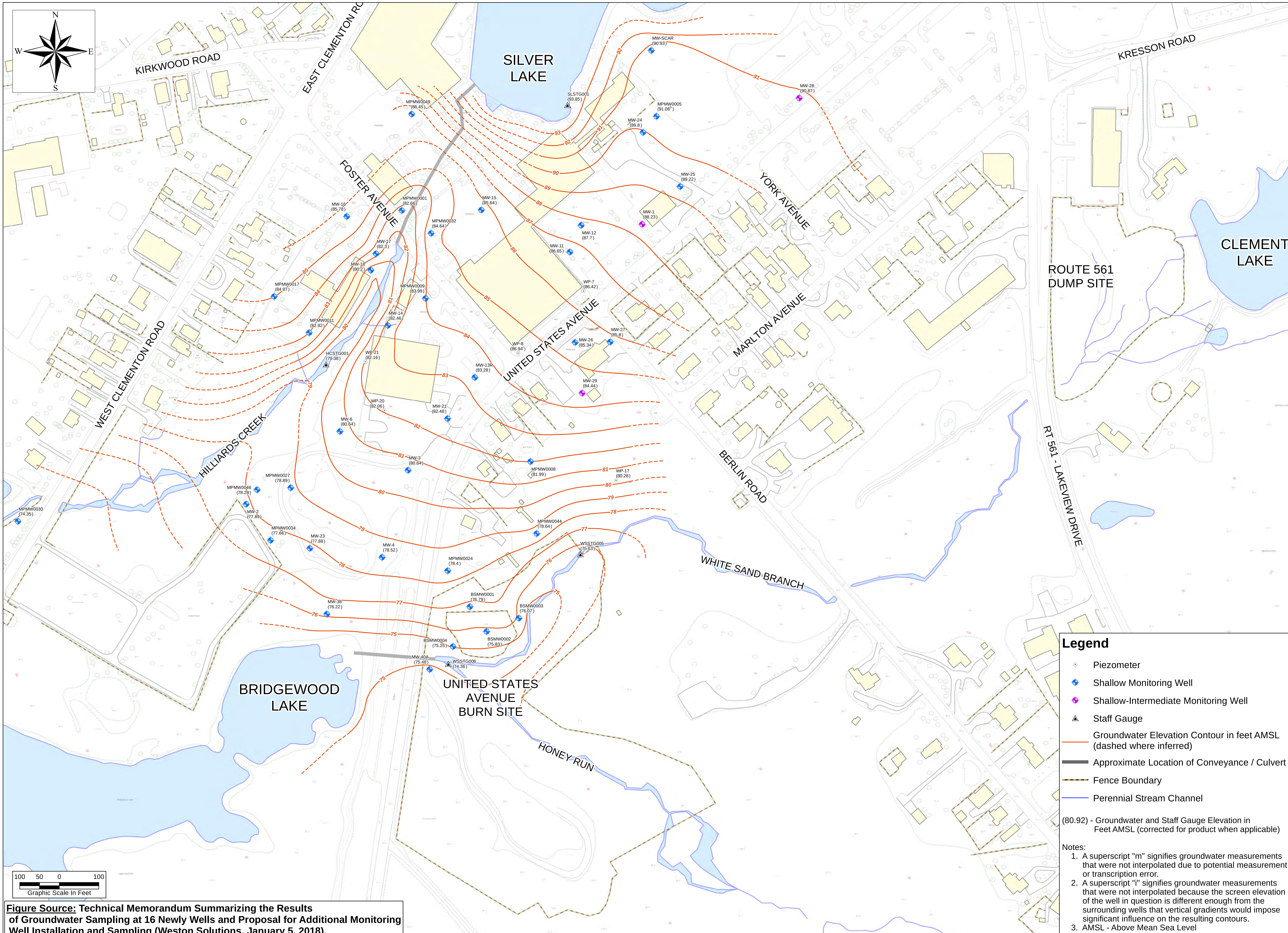


Figure Source: Technical Memorandum Summarizing the Results of Groundwater Sampling at 16 Newly Wells and Proposal for Additional Monitoring Well Installation and Sampling (Weston Solutions, January 5, 2018).

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 5-11 GWCON_Shallow.mxd

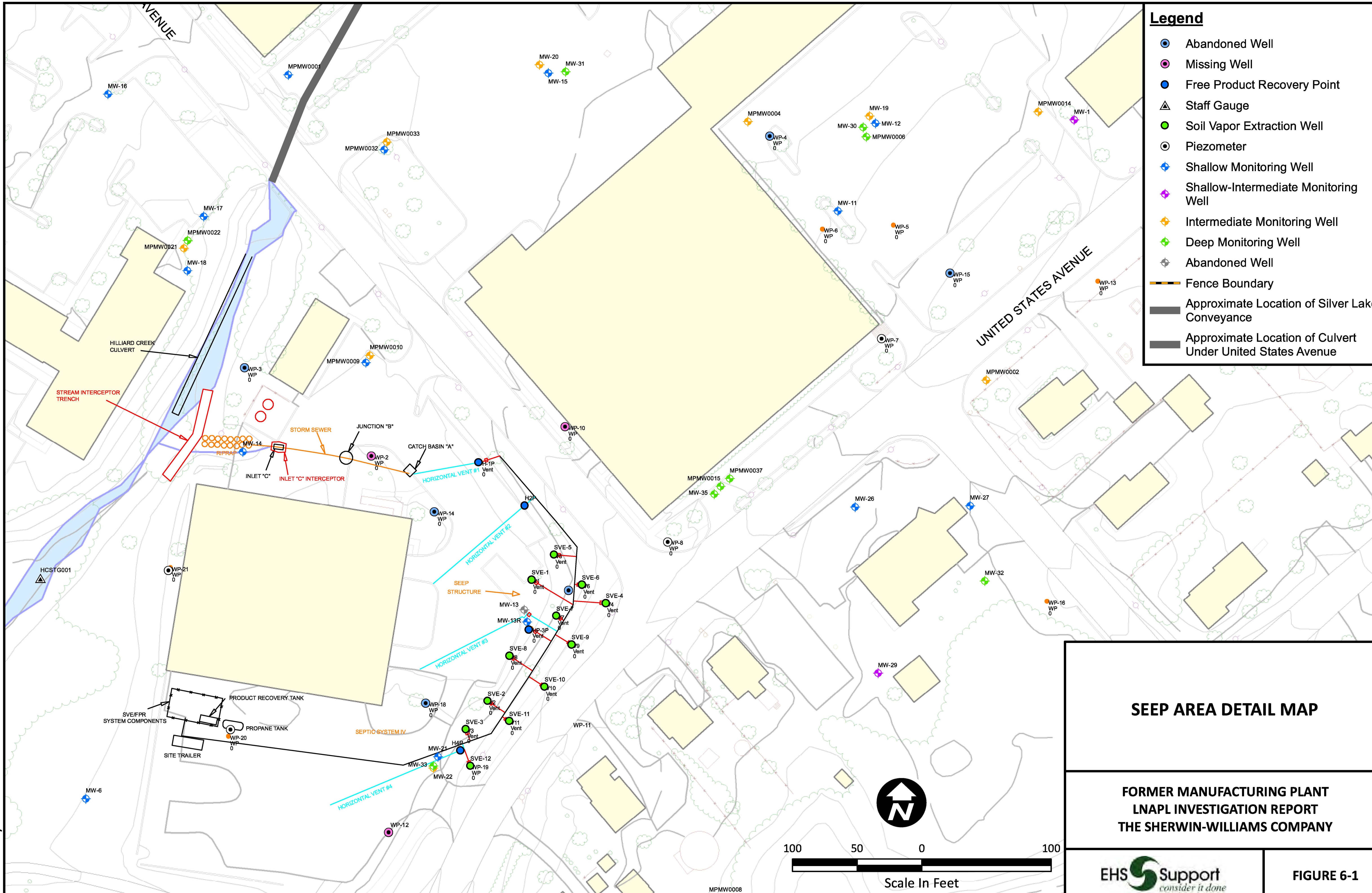
EHS Support consider it done

Former Manufacturing Plant
LNAPL Investigation Report
The Sherwin-Williams Company

GROUNDWATER CONTOURS SHALLOW ZONE AUGUST 2017

FIGURE 5-11

Printed 2/16/2018 2:06:37 PM by ASmith


Legend
Abandoned Well
Missing Well
Free Product Recovery Point
Staff Gauge
Soil Vapor Extraction Well
Piezometer
Shallow Monitoring Well
Shallow-Intermediate Monitoring Well
Intermediate Monitoring Well
Deep Monitoring Well
Abandoned Well
Fence Boundary
Approximate Location of Silver Lake Conveyance
Approximate Location of Culvert Under United States Avenue
UNITED STATES AVENUE
HILLIARD CREEK CULVERT
STREAM INTERCEPTOR TRENCH
STORM SEWER
JUNCTION "B"
CATCH BASIN "A"
INLET "C"
INLET "C" INTERCEPTOR
RIPRAP
HORIZONTAL VENT #1
HORIZONTAL VENT #2
HORIZONTAL VENT #3
HORIZONTAL VENT #4
SEEP STRUCTURE
PRODUCT RECOVERY TANK
SVE/FPR SYSTEM COMPONENTS
PROPANE TANK
SITE TRAILER
SEPTIC SYSTEM IV
HCSTG001
MW-1
MW-6
MW-11
MW-12
MW-13
MW-13R
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-26
MW-27
MW-29
MW-30
MW-31
MW-32
MW-33
MW-35
MPMW0001
MPMW0002
MPMW0004
MPMW0006
MPMW0008
MPMW0009
MPMW0010
MPMW0014
MPMW0015
MPMW0021
MPMW0022
MPMW0032
MPMW0033
MPMW0037
WP-2
WP-3
WP-4
WP-5
WP-6
WP-7
WP-8
WP-10
WP-11
WP-12
WP-13
WP-14
WP-15
WP-16
WP-18
WP-19
WP-20
WP-21
H1P
H2P
H3P
H4P
SVE-1
SVE-2
SVE-3
SVE-4
SVE-5
SVE-6
SVE-7
SVE-8
SVE-9
SVE-10
SVE-11
SVE-12
100
50
0
100
Scale In Feet
N
SEEP AREA DETAIL MAP
FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY
EHS Support
consider it done
FIGURE 6-1
Reviewed By:
J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 6-1 - Seep Area Detail Map - 110315 - Rev 1.mxd
Printed 3/19/2018 4:52:13 PM by Alex.Smith

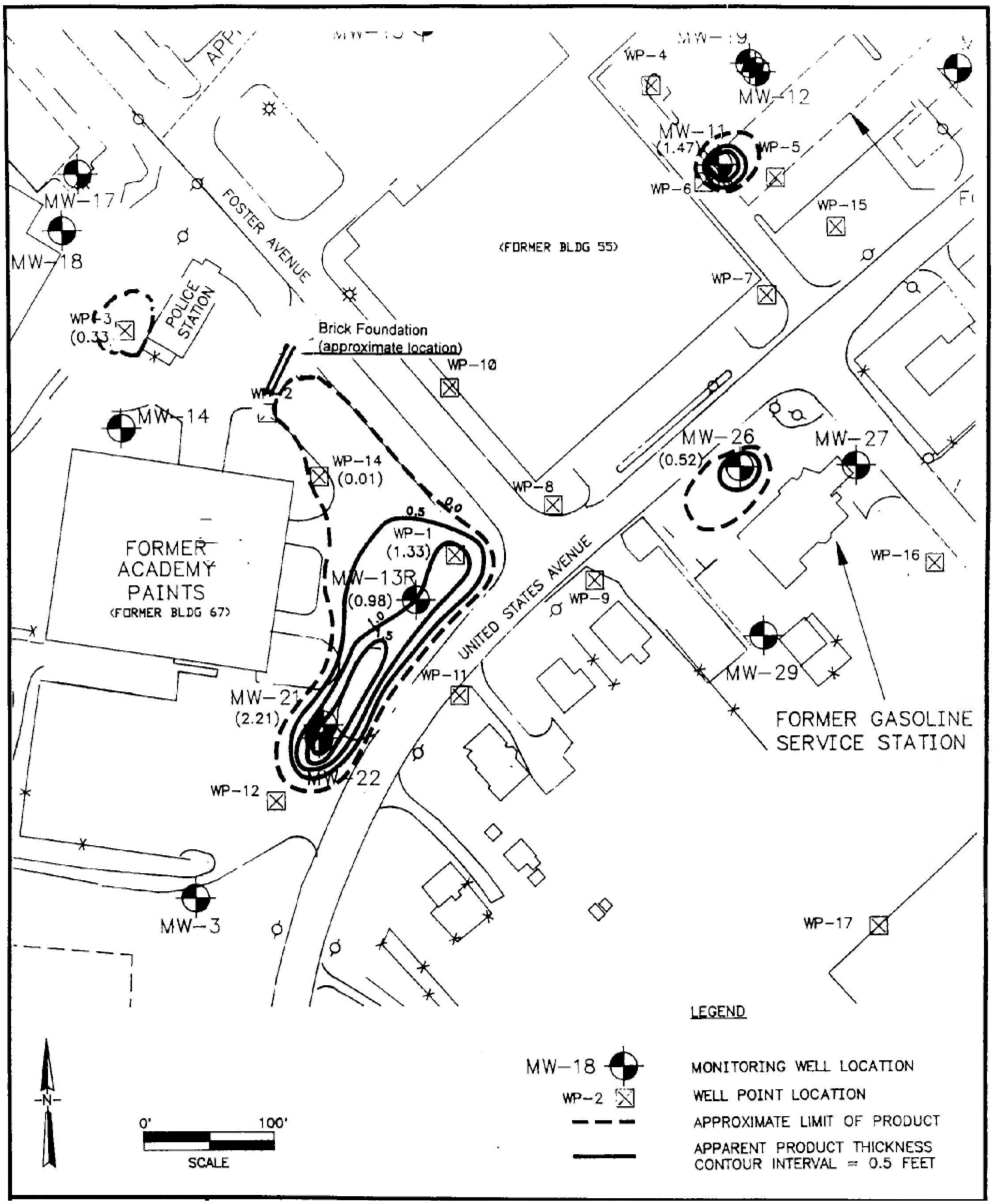
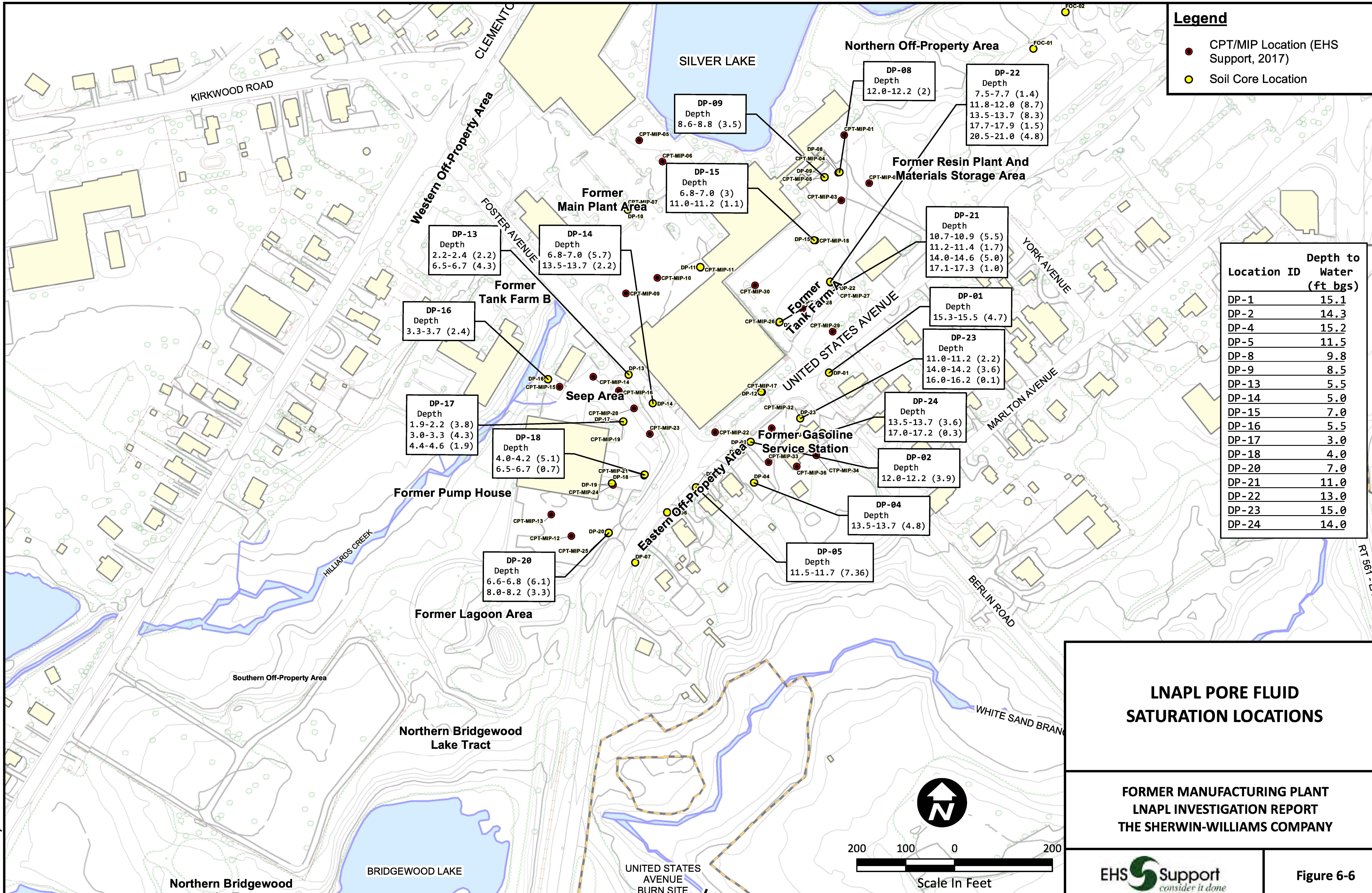


Figure Source:
Comprehensive Remedial Investigation Report
(Weston Solutions, 2004).

EHS Support consider it done	FORMER MANUFACTURING PLANT LNAPL INVESTIGATION REPORT THE SHERWIN-WILLIAMS COMPANY	**FREE PHASE PRODUCT APPARENT THICKNESS ISOPACH MAP JULY 1995**	**FIGURE 6-2**

D:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Fig 6-2 - Free Phase Product Apparent Thickness Jul 1995- 110315 - Rev 1.mxd

Printed 2/15/2018 2:16:32 PM by ASmith



Location ID	Depth to Water (ft bgs)
DP-1	15.1
DP-2	14.3
DP-4	15.2
DP-5	11.5
DP-8	9.8
DP-9	8.5
DP-13	5.5
DP-14	5.0
DP-15	7.0
DP-16	5.5
DP-17	3.0
DP-18	4.0
DP-20	7.0
DP-21	11.0
DP-22	13.0
DP-23	15.0
DP-24	14.0

LNAPL PORE FLUID SATURATION LOCATIONS

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

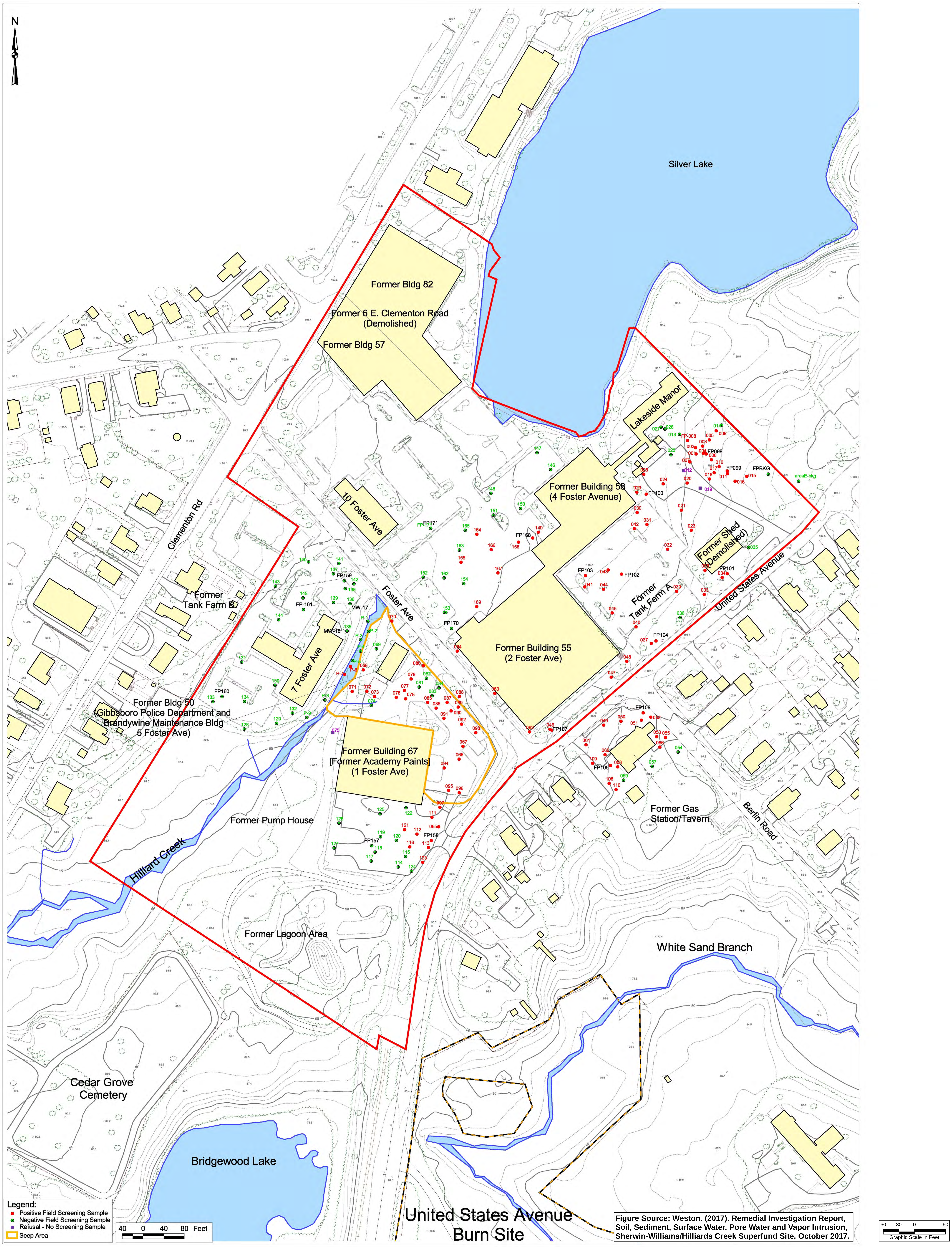
EHS Support consider it done

Figure 6-6

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd

Printed 3/19/2018 4:52:31 PM by Alex.Smith



EHS Support consider it done

FORMER MANUFACTURING PLAN
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

SOIL SCREENING INVESTIGATION
SAMPLE LOCATIONS
EXTENT OF PRODUCT - IMPACTED SOILS
SEPTEMBER 2003 - DECEMBER 2003

FIGURE 6-7

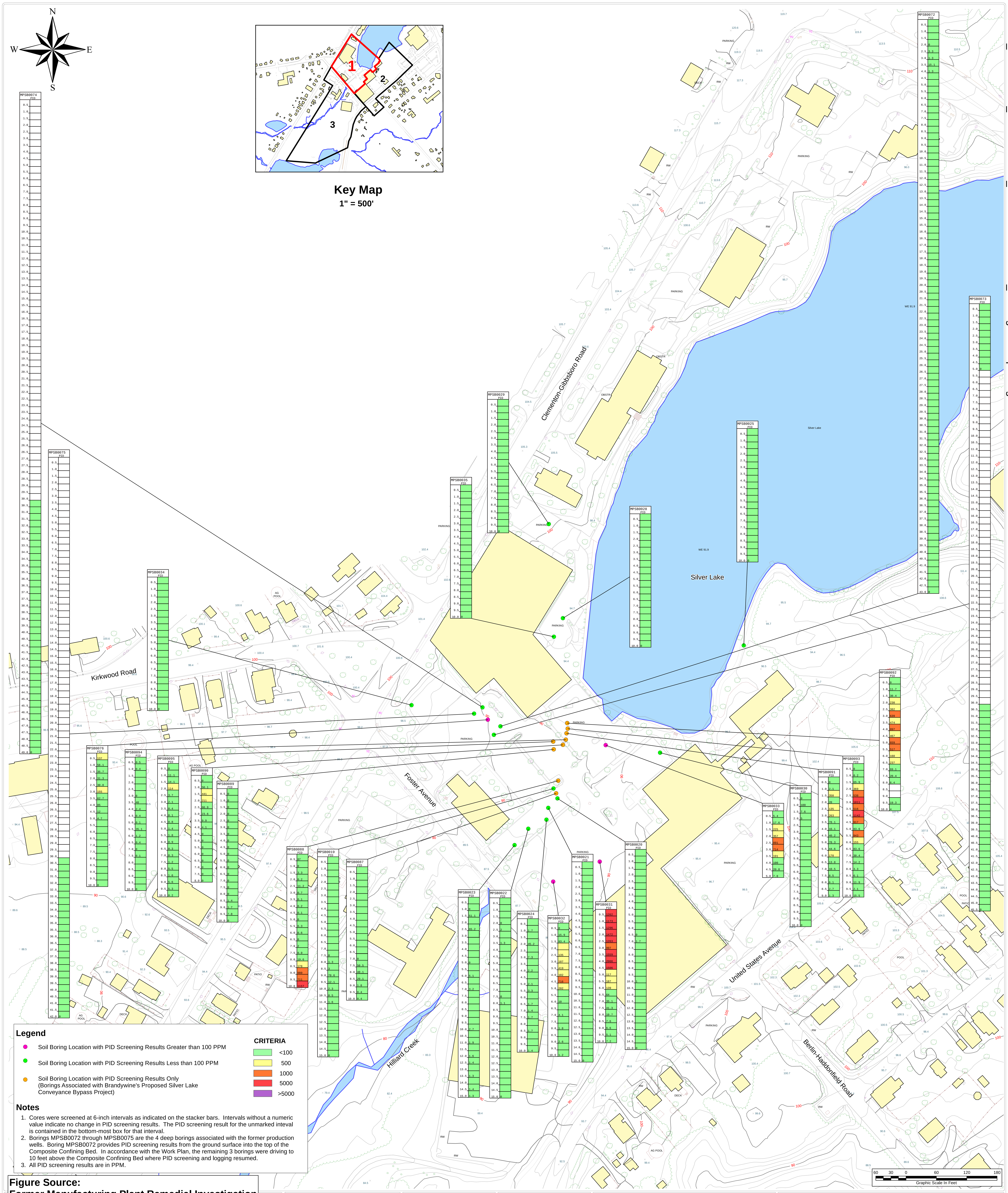


Figure Source:
Former Manufacturing Plant Remedial Investigation (Weston Solutions, March 2011).

D:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 6-8A - 20160217.mxd

Printed 2/16/2018 2:00:44 PM by ASmith

EHS Support *consider it done*

EHS Support consider it done	Former Manufacturing Plant LNAPL Investigation Report The Sherwin-Williams Company	**PID SCREENING RESULTS (SOIL ONLY) AREA 1 OF 3**	**FIGURE 6-8A**

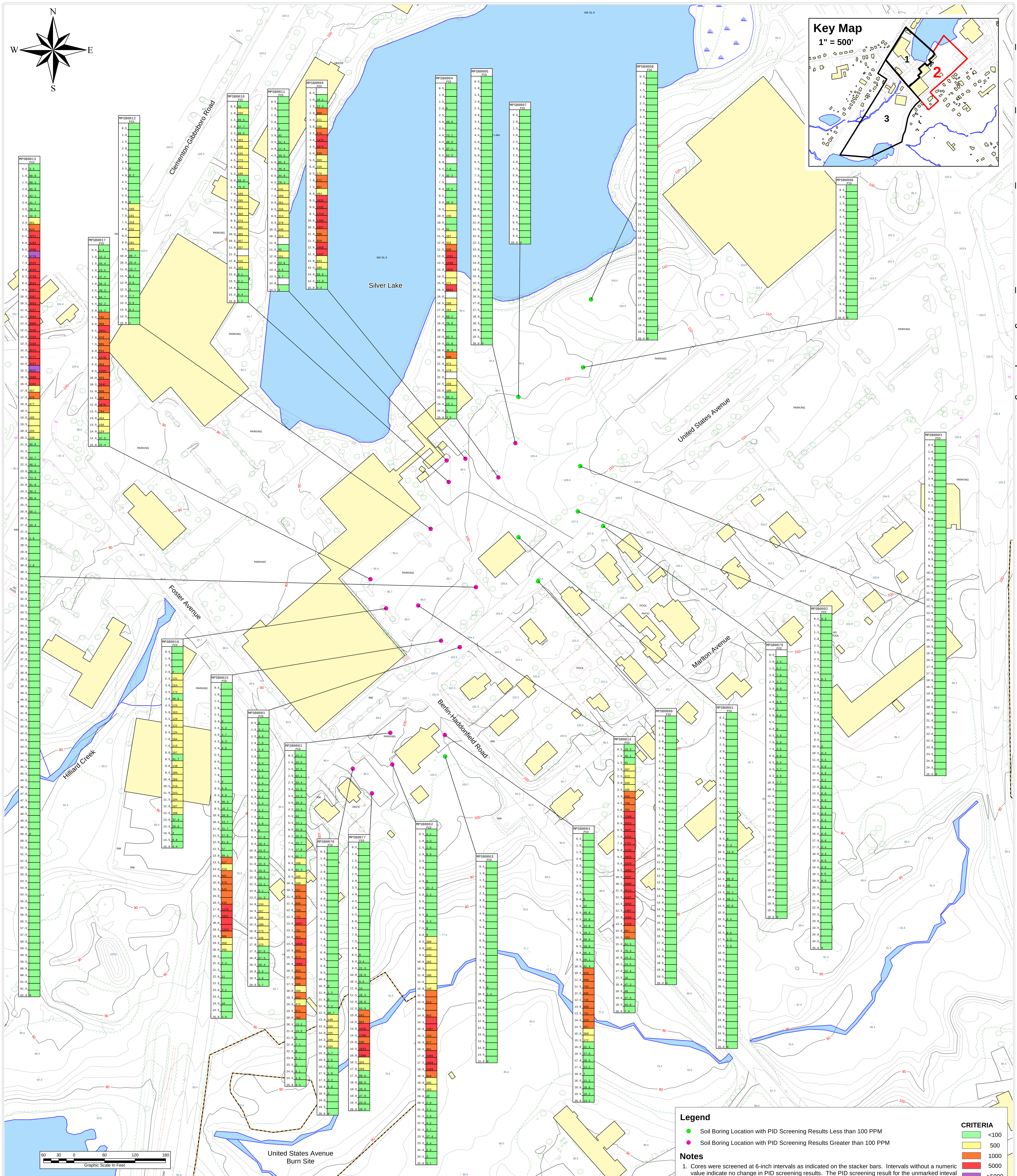


Figure Source:
Former Manufacturing Plant Remedial Investigation (Weston Solutions, March 2011).

EHS Support *consider it done*

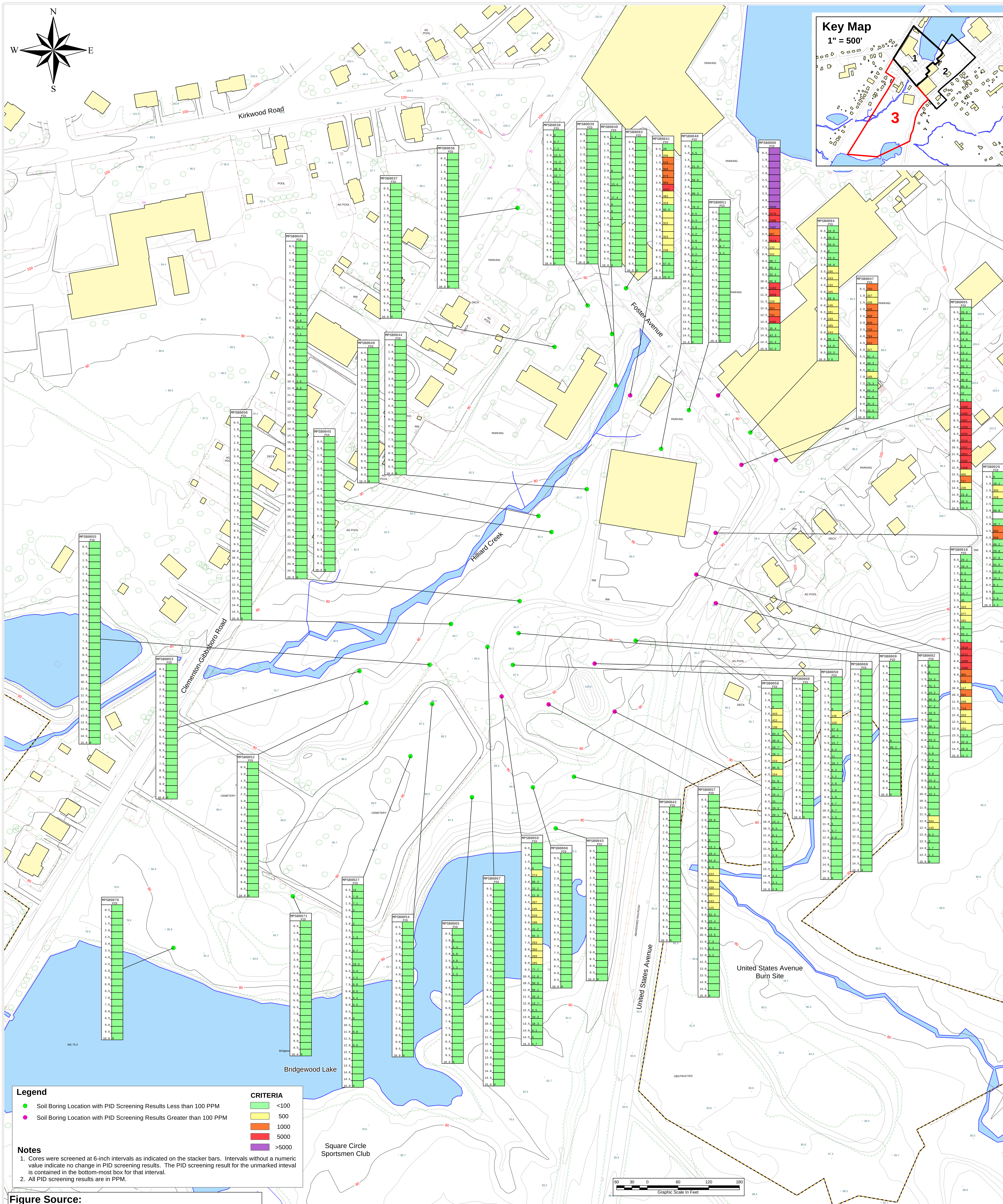
Former Manufacturing Plant
LNAPL Investigation Report
The Sherwin-Williams Company

PID SCREENING RESULTS (SOIL ONLY) AREA 2 OF 3

FIGURE 6-8B

D:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 6-8B - 20160217.mxd

Printed 2/16/2018 2:00:55 PM by ASmith



Legend

- Soil Boring Location with PID Screening Results Less than 100 PPM
- Soil Boring Location with PID Screening Results Greater than 100 PPM

CRITERIA

- <100
- 500
- 1000
- 5000
- >5000

Notes

1. Cores were screened at 6-inch intervals as indicated on the stacker bars. Intervals without a numeric value indicate no change in PID screening results. The PID screening result for the unmarked inteval is contained in the bottom-most box for that interval.
2. All PID screening results are in PPM.

Figure Source:
Former Manufacturing Plant Remedial Investigation (Weston Solutions, March 2011).

D:\EHSS_GIS\C05552_ThePaintCo\01_InvestigationReport\Figure 6-8C - 20160217.mxd

Printed 2/16/2018 2:00:33 PM by ASmith

EHS Support consider it done	Former Manufacturing Plant LNAPL Investigation Report The Sherwin-Williams Company	PID SCREENING RESULTS (SOIL ONLY) AREA 3 OF 3	FIGURE 6-8C

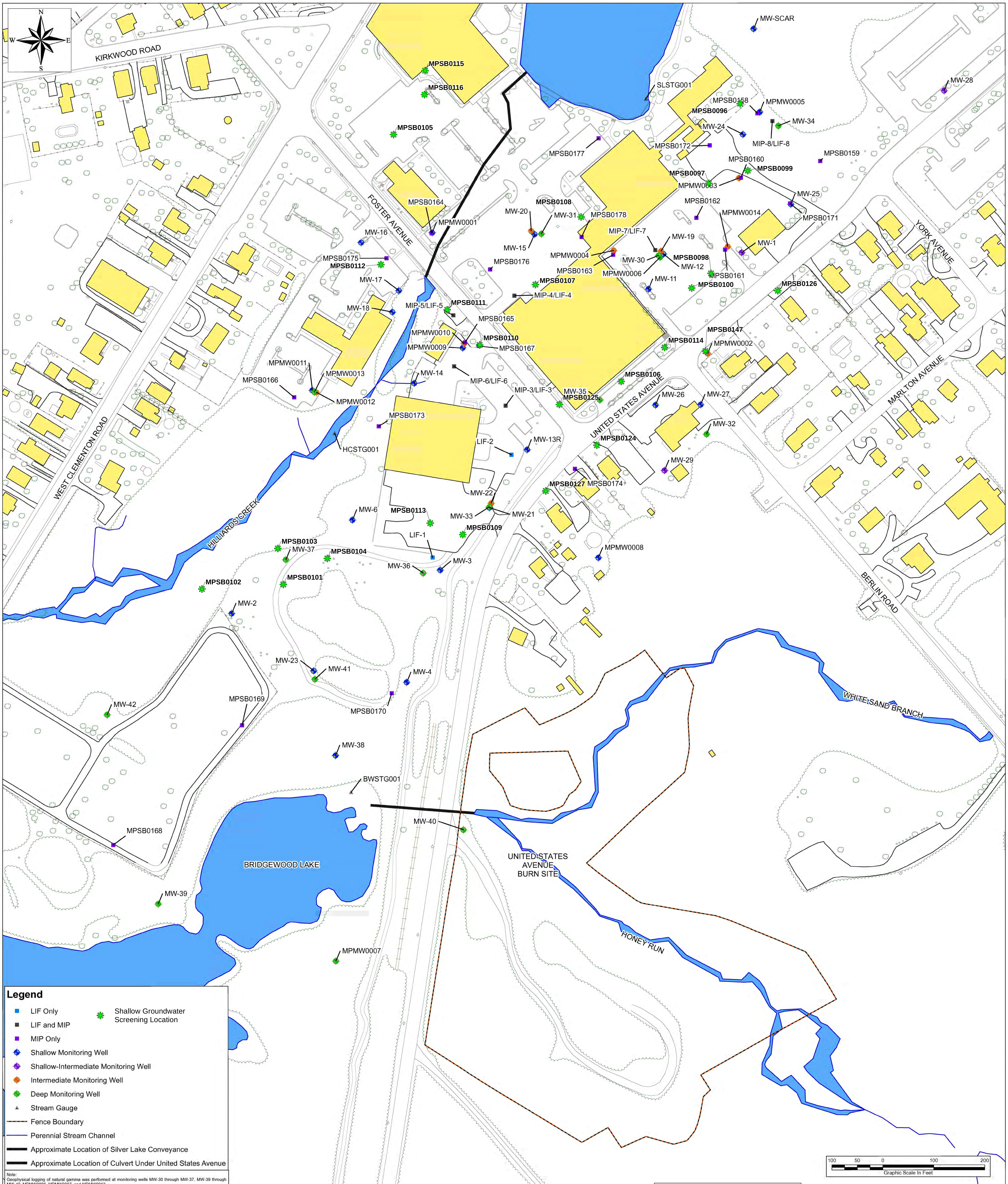
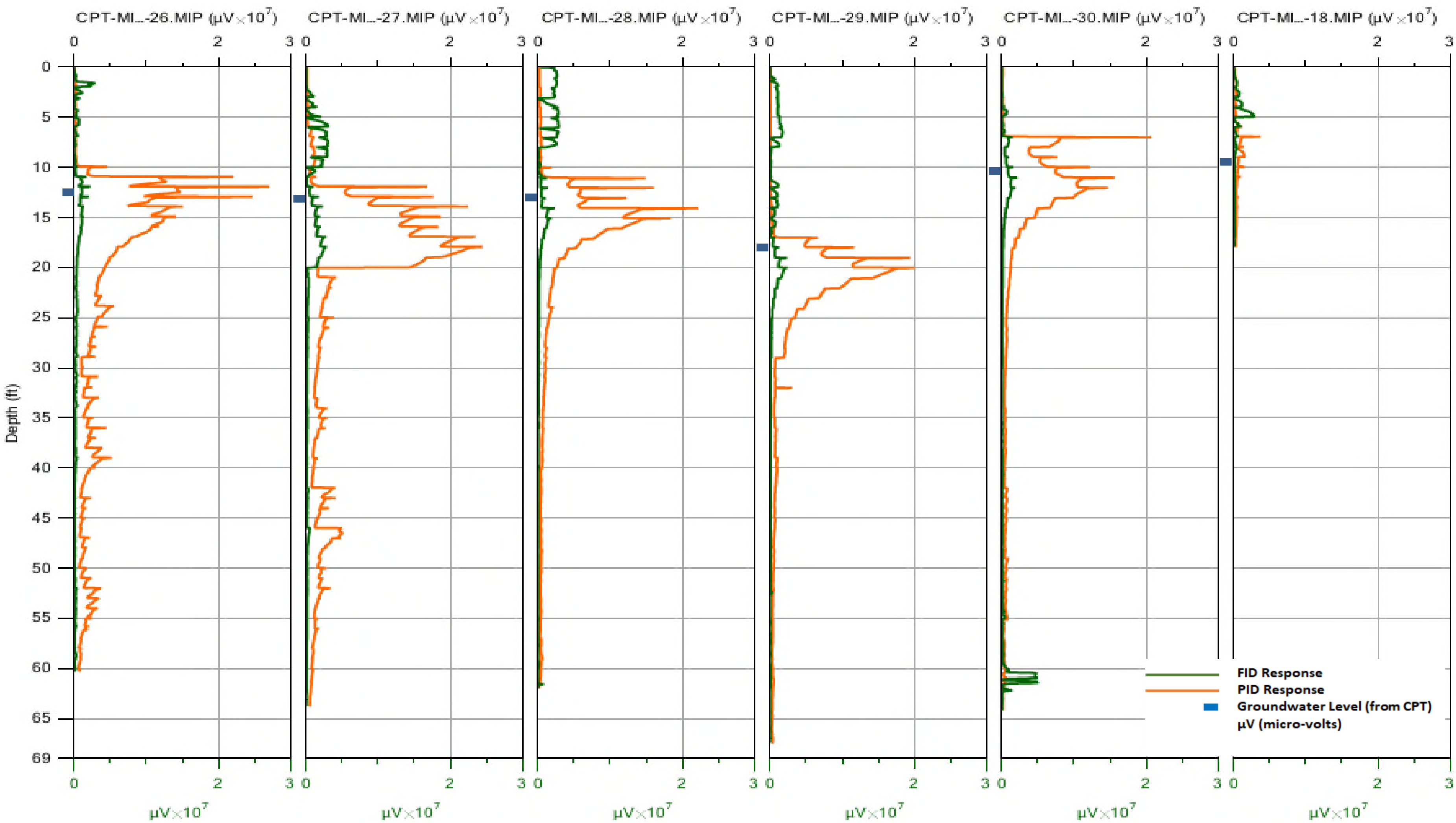


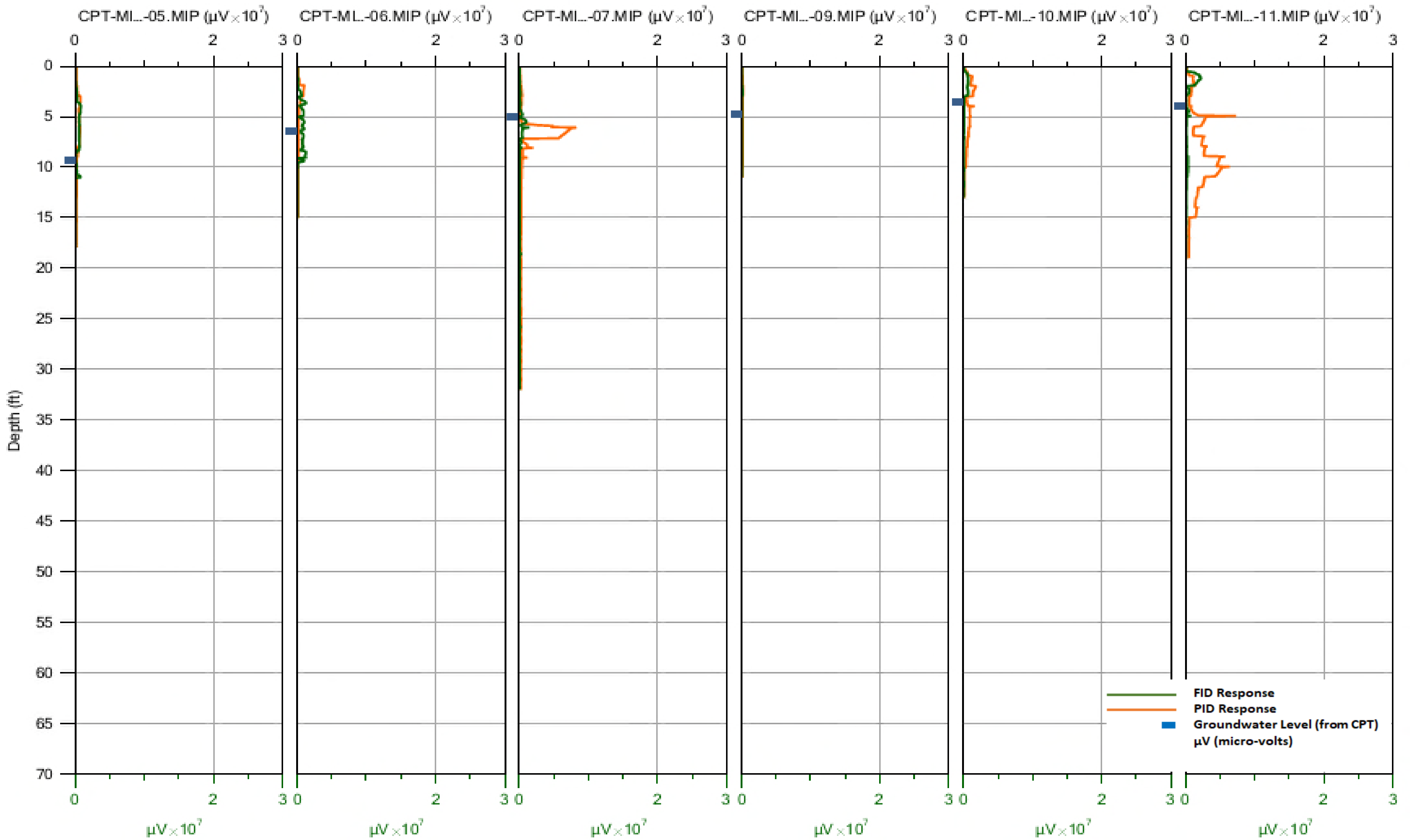
Figure Source: Weston. (2014). Groundwater Technical Memorandum, Former Manufacturing Plant Area, Sherwin-Williams/Hillards Creek Site

EHS Support consider it done	FORMER MANUFACTURING PLAN LNAPL INVESTIGATION REPORT THE SHERWIN-WILLIAMS COMPANY	FORMER MANUFACTURING PLANT MIP-LIF AND SHALLOW GROUNDWATER SCREENING LOCATIONS	FIGURE 6-9



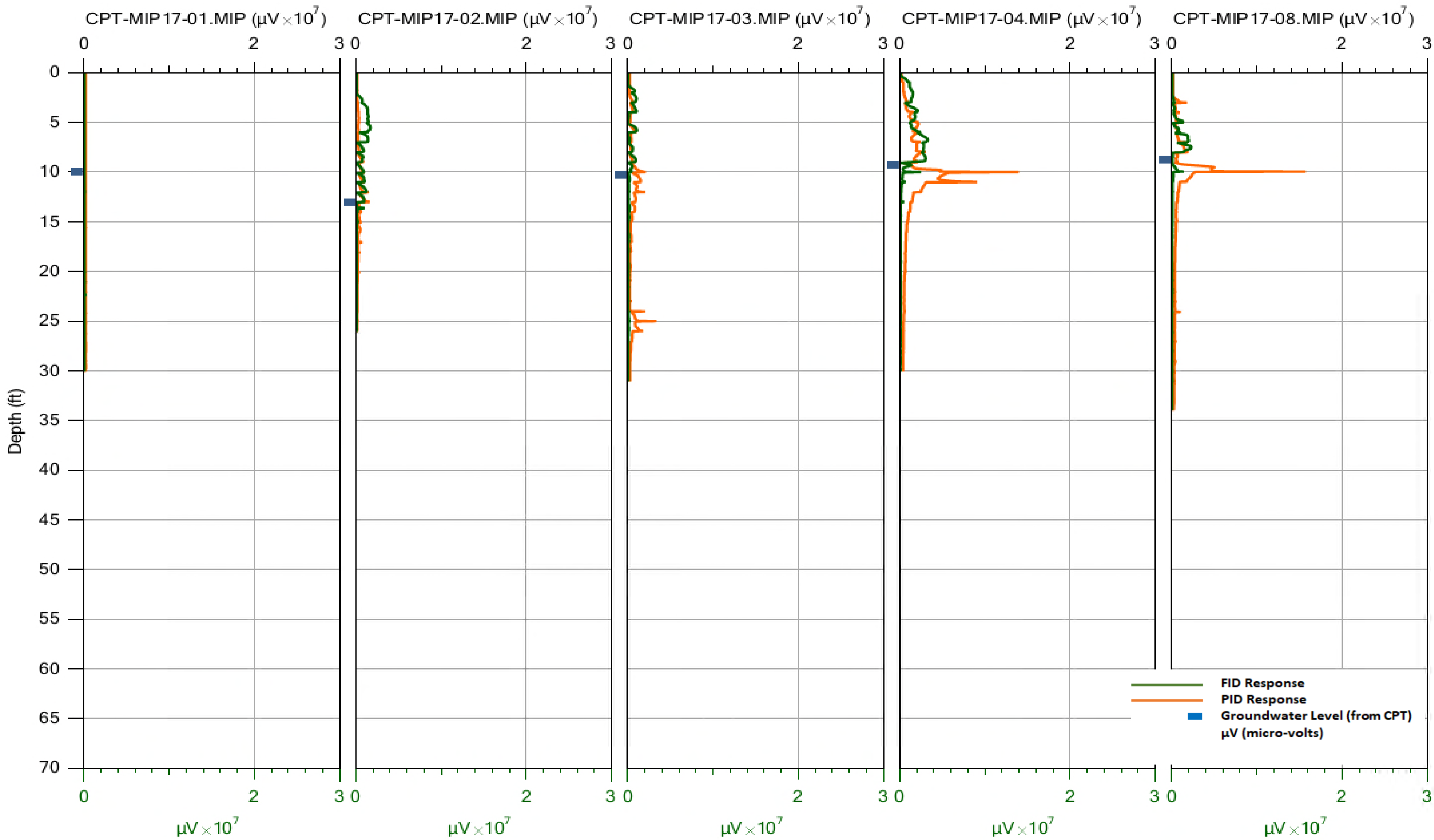
EHS Support consider it done

Figure 6-10A
Areas A and B PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



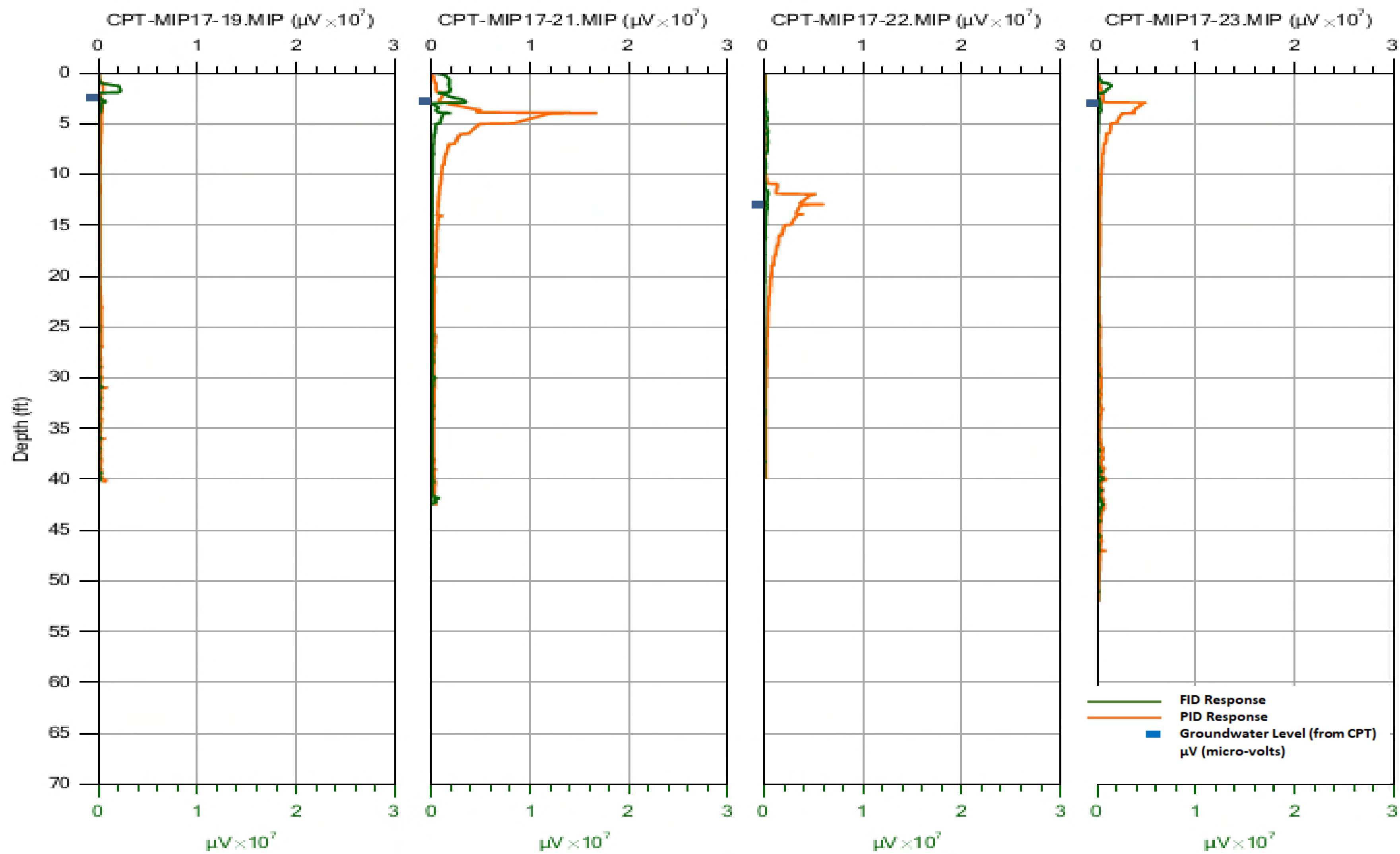
EHS Support *consider it done*

Figure 6-10B
Areas I & C PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



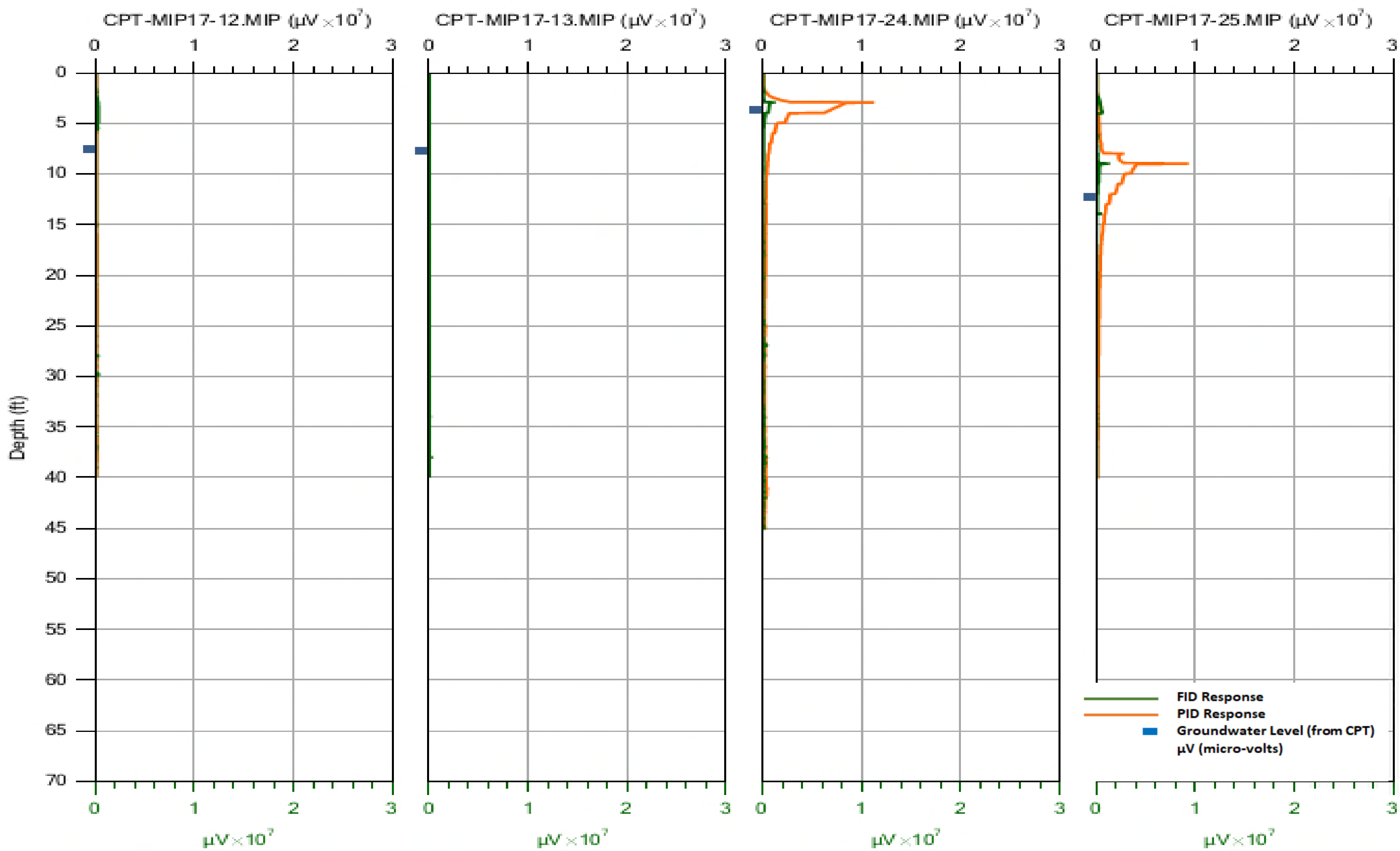
EHS Support
consider it done

Figure 6-10C
Area D PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



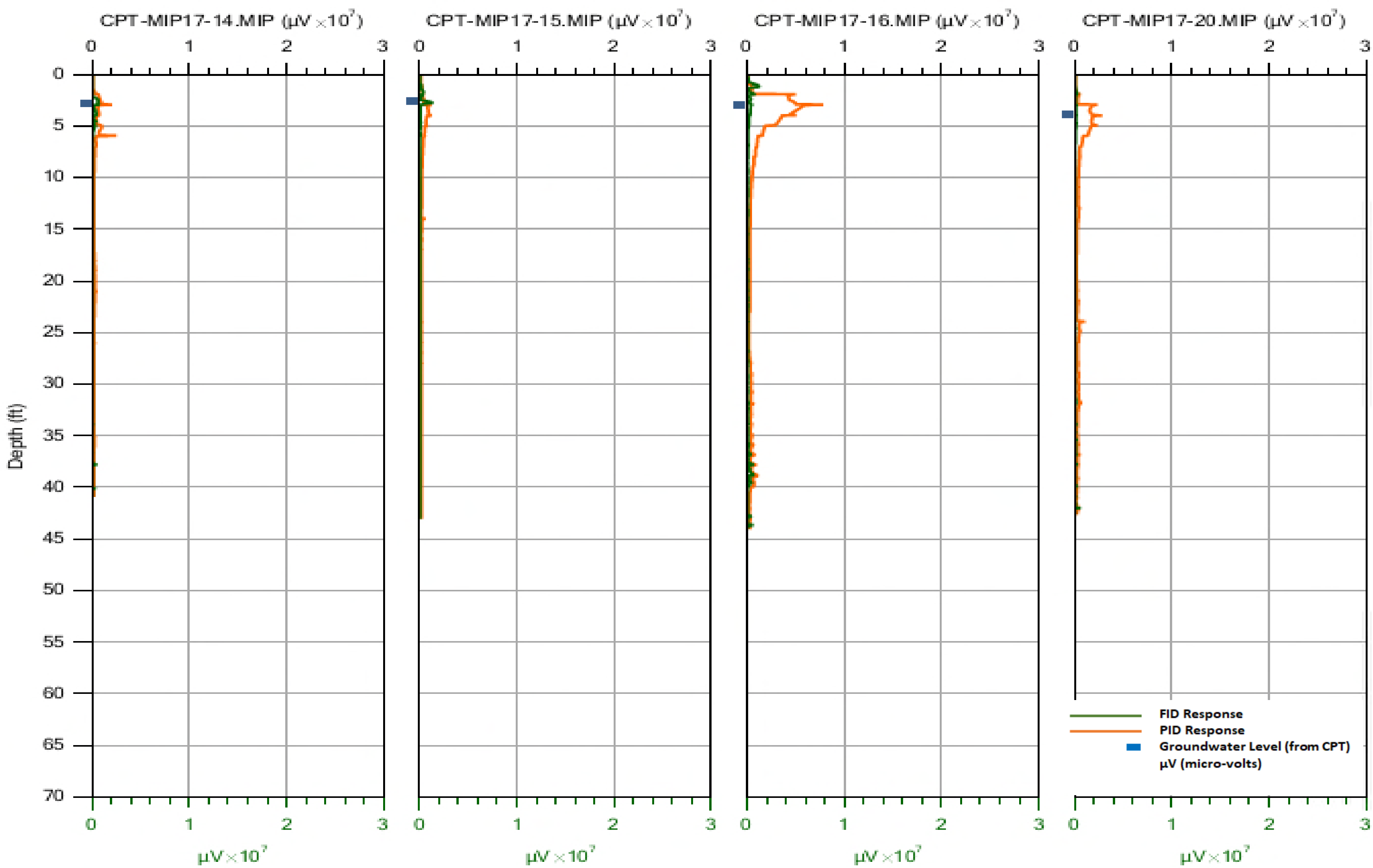
EHS Support
consider it done

Figure 6-10D
Area E PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



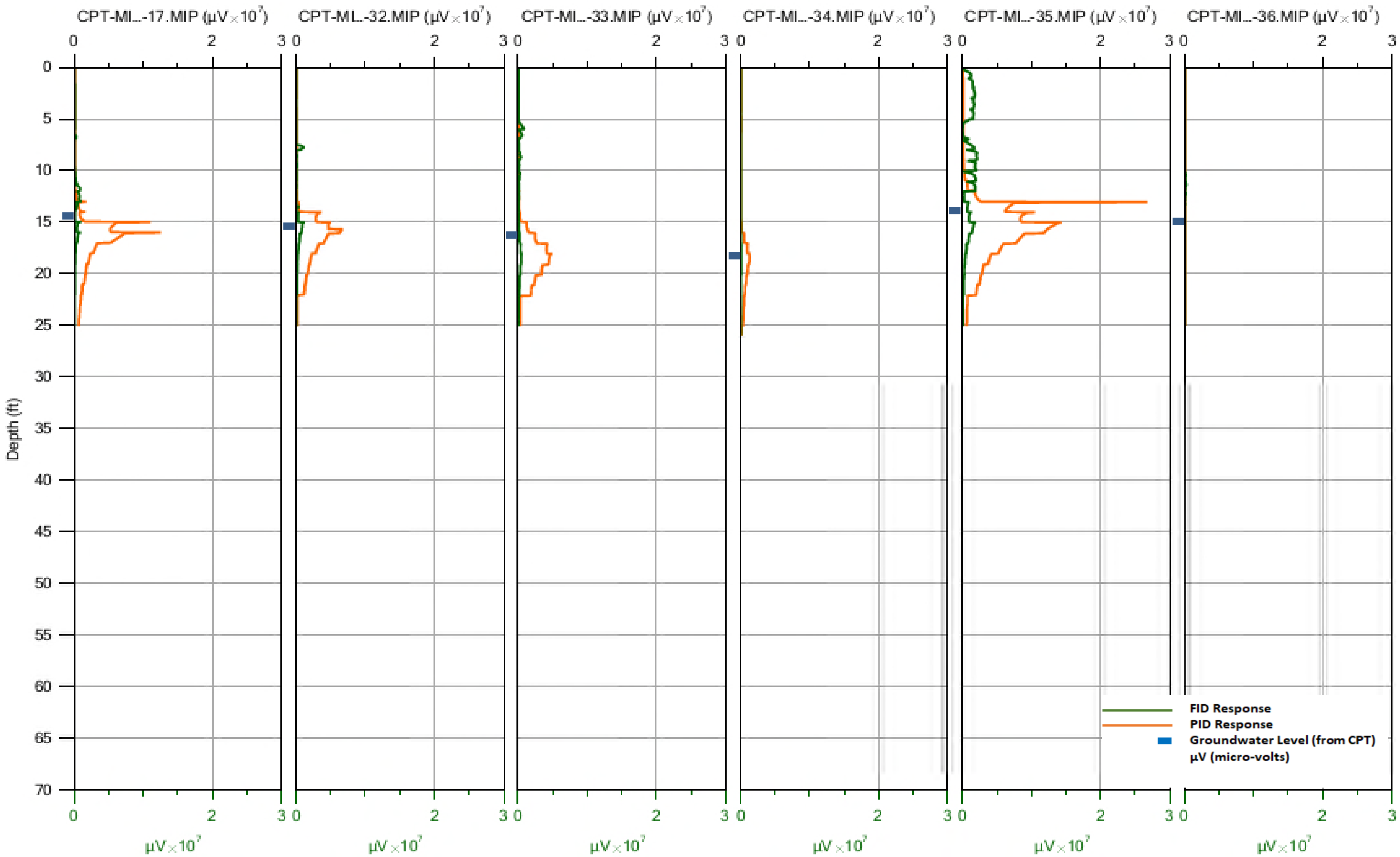
EHS Support
consider it done

Figure 6-10E
Area F PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



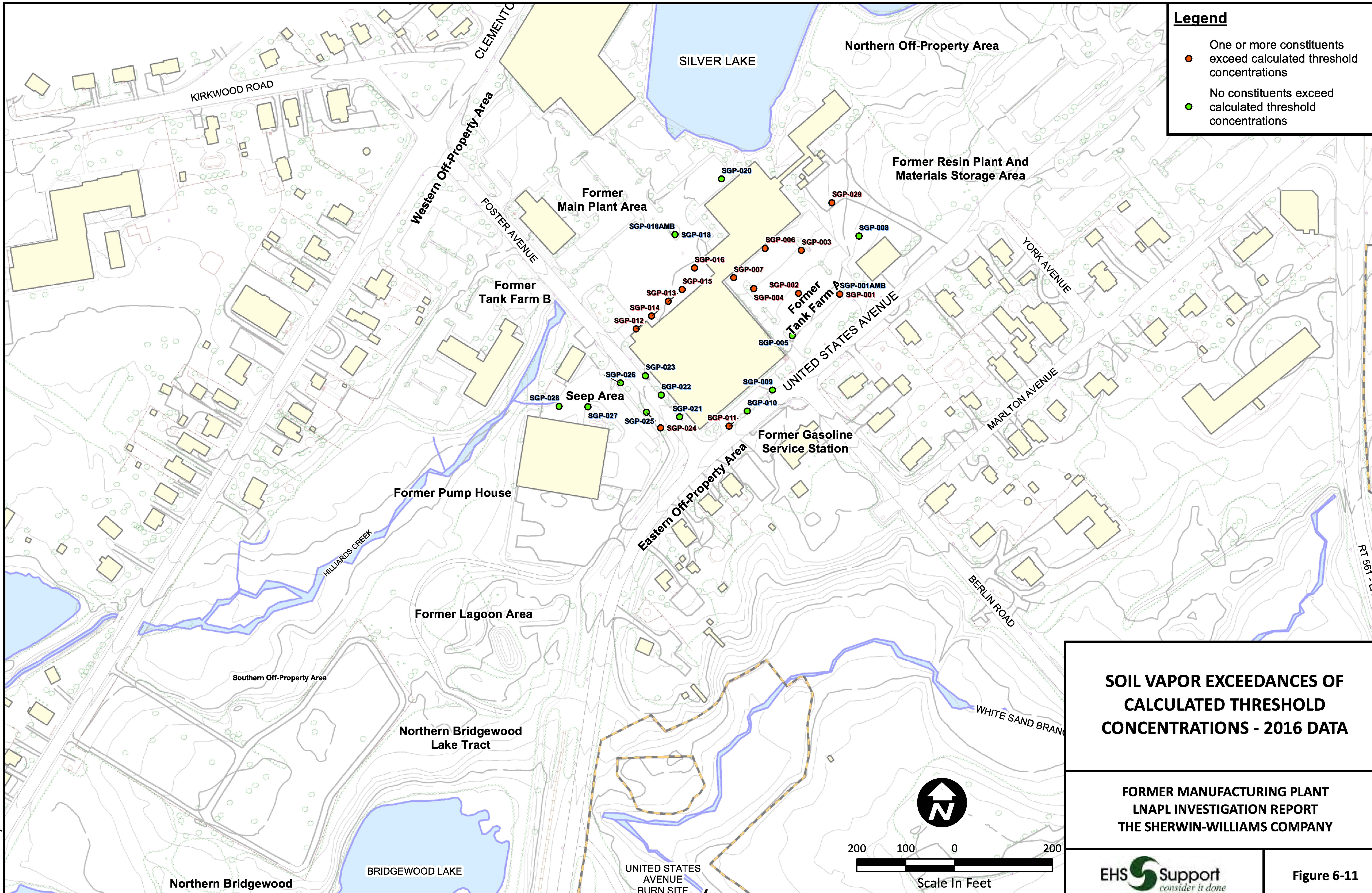
EHS Support consider it done

Figure 6-10F
Area K PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



EHS Support
consider it done

Figure 6-10G
Areas G & J PID Max / FID Max
The Sherwin-Williams Company
Gibbsboro, New Jersey



SOIL VAPOR EXCEEDANCES OF CALCULATED THRESHOLD CONCENTRATIONS - 2016 DATA

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

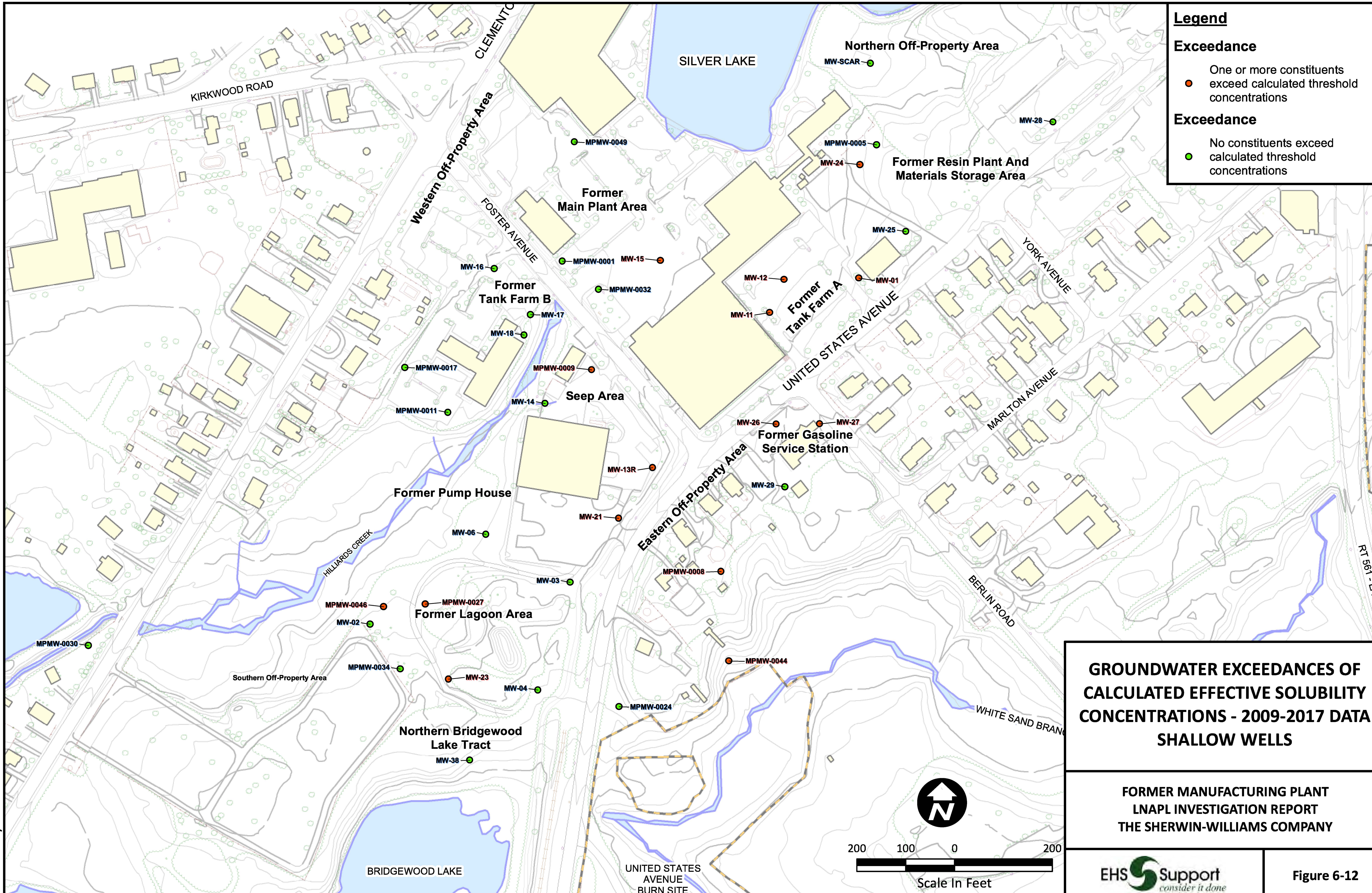
EHS Support *consider it done*

Figure 6-11

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd

Printed 3/19/2018 4:52:47 PM by Alex.Smith

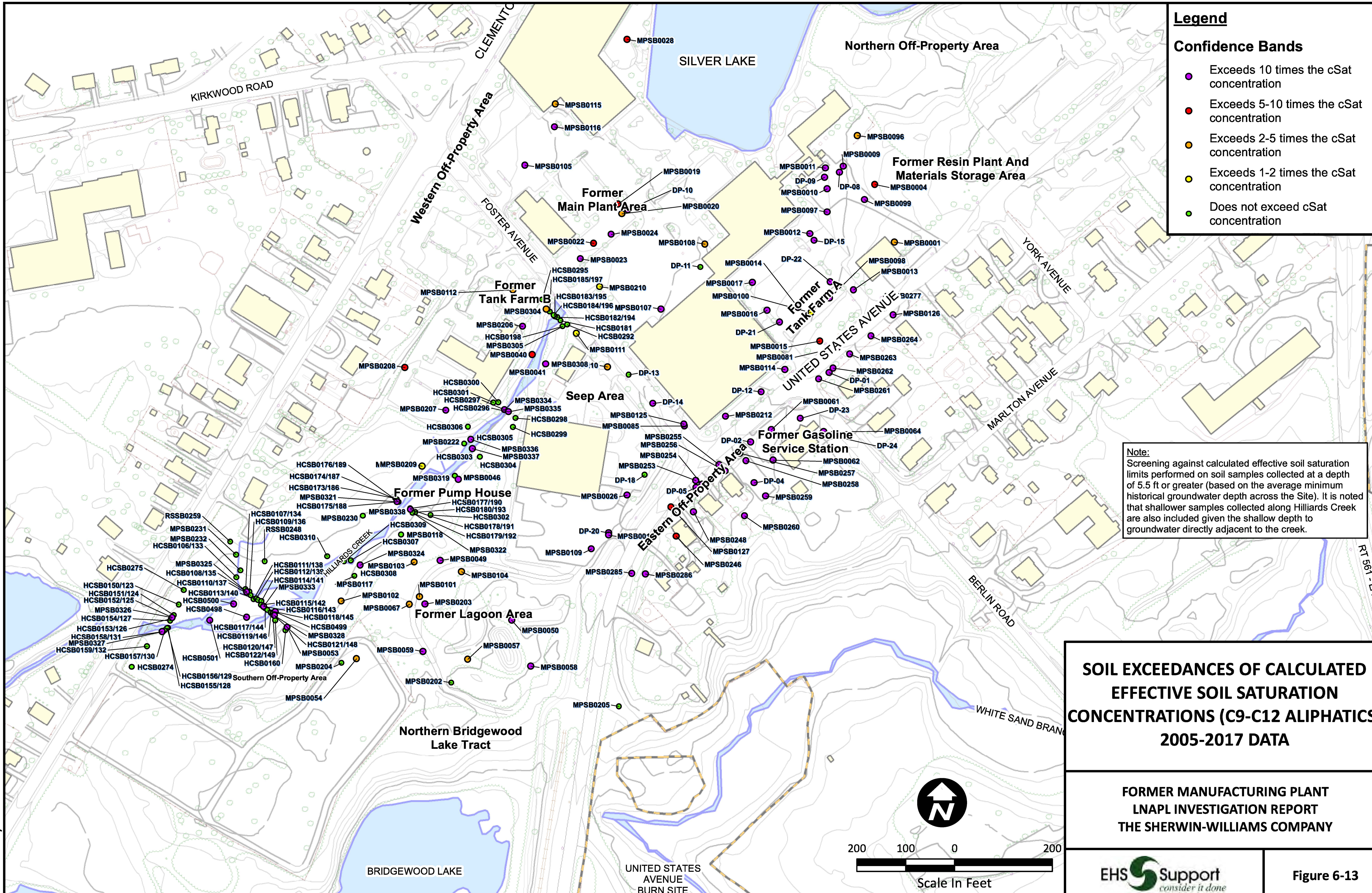


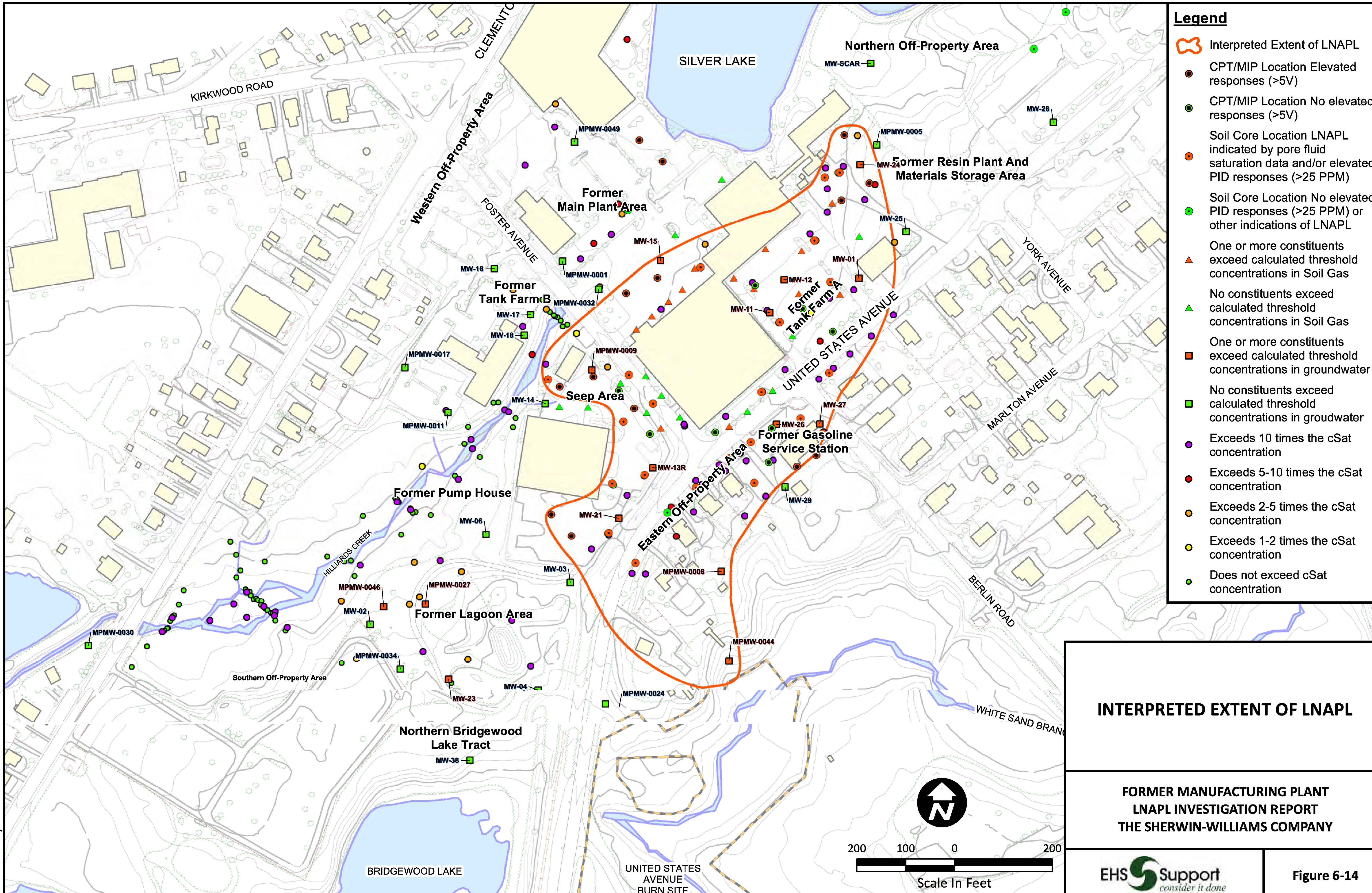
GROUNDWATER EXCEEDANCES OF CALCULATED EFFECTIVE SOLUBILITY CONCENTRATIONS - 2009-2017 DATA SHALLOW WELLS

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support consider it done

Figure 6-12


Legend
Confidence Bands
Exceeds 10 times the cSat concentration
Exceeds 5-10 times the cSat concentration
Exceeds 2-5 times the cSat concentration
Exceeds 1-2 times the cSat concentration
Does not exceed cSat concentration
Note:
Screening against calculated effective soil saturation limits performed on soil samples collected at a depth of 5.5 ft or greater (based on the average minimum historical groundwater depth across the Site). It is noted that shallower samples collected along Hilliards Creek are also included given the shallow depth to groundwater directly adjacent to the creek.
SILVER LAKE
Northern Off-Property Area
Former Resin Plant And Materials Storage Area
Former Main Plant Area
Former Tank Farm B
Former Tank Farm A
Seep Area
Former Gasoline Service Station
Eastern Off-Property Area
Former Pump House
Former Lagoon Area
Western Off-Property Area
Southern Off-Property Area
Northern Bridgewood Lake Tract
BRIDGEWOOD LAKE
UNITED STATES AVENUE BURN SITE
HILLIARDS CREEK
KIRKWOOD ROAD
CLEMENTON
FOSTER AVENUE
UNITED STATES AVENUE
YORK AVENUE
MARLTON AVENUE
BERLIN ROAD
WHITE SAND BRANCH
RT 561 - LAKESIDE
200 100 0 200
Scale In Feet
SOIL EXCEEDANCES OF CALCULATED EFFECTIVE SOIL SATURATION CONCENTRATIONS (C9-C12 ALIPHATICS) 2005-2017 DATA
FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY
EHS Support
consider it done
Figure 6-13
Reviewed By:
J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd
Printed 3/19/2018 4:53:17 PM by Alex.Smith



INTERPRETED EXTENT OF LNAPL

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

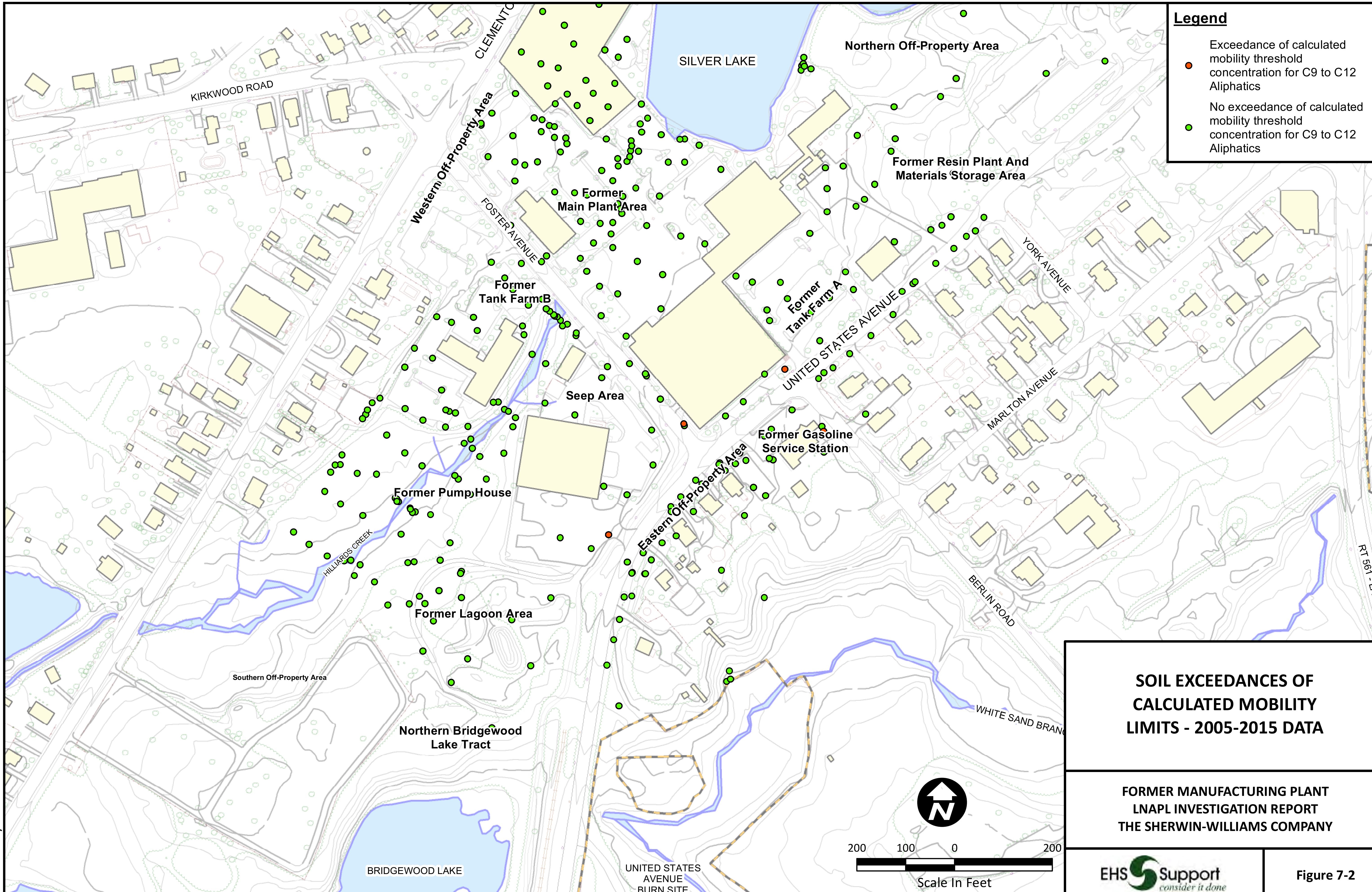
EHS Support *consider it done*

Figure 6-14

Reviewed By:

J:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd

Printed 3/19/2018 4:54:07 PM by Alex.Smith



SOIL EXCEEDANCES OF CALCULATED MOBILITY LIMITS - 2005-2015 DATA

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

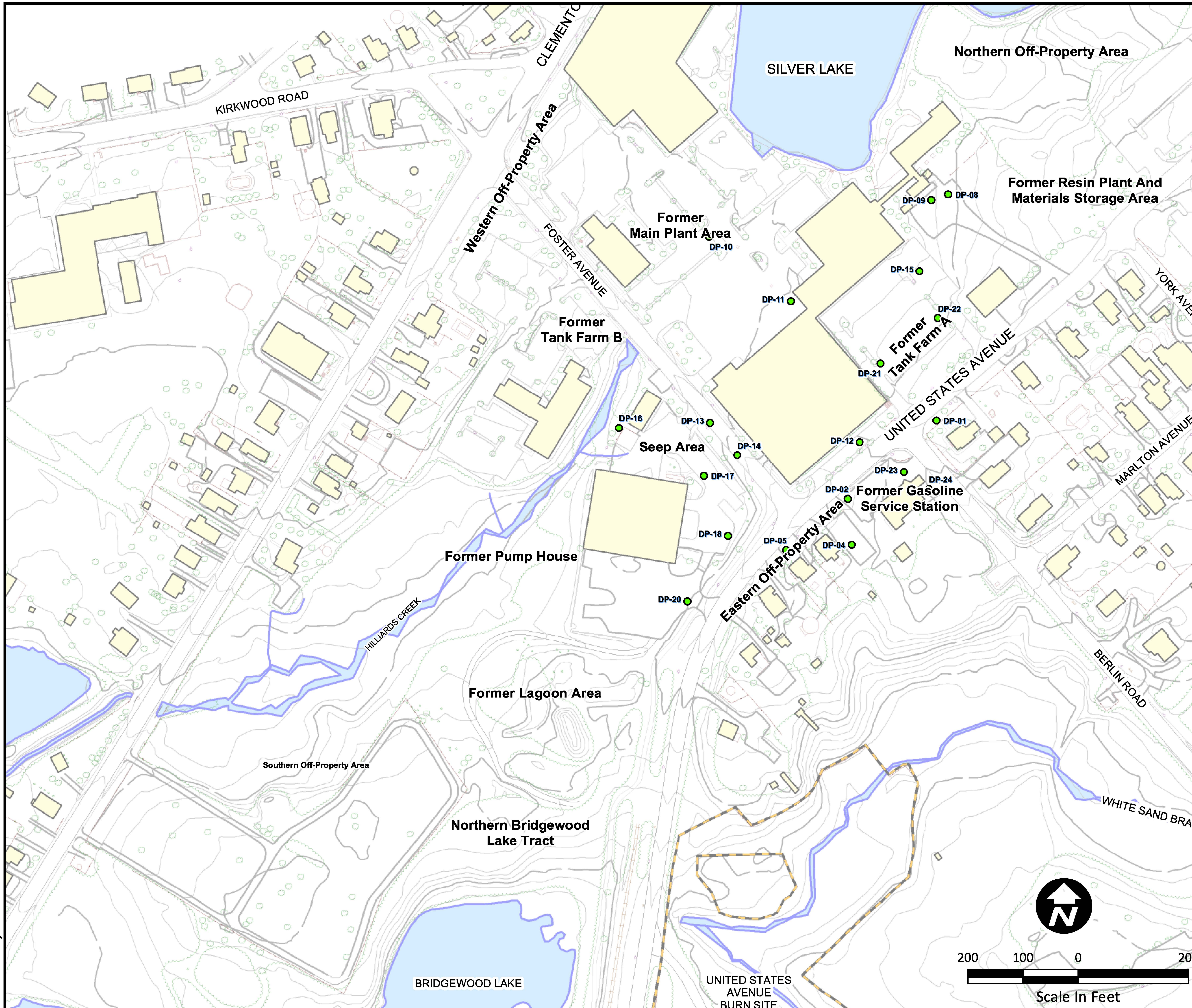
EHS Support *consider it done*

Figure 7-2

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd

Printed 3/20/2018 4:13:42 PM by Alex.Smith



SOIL EXCEEDANCES OF CALCULATED MOBILITY LIMITS - 2017 DATA

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

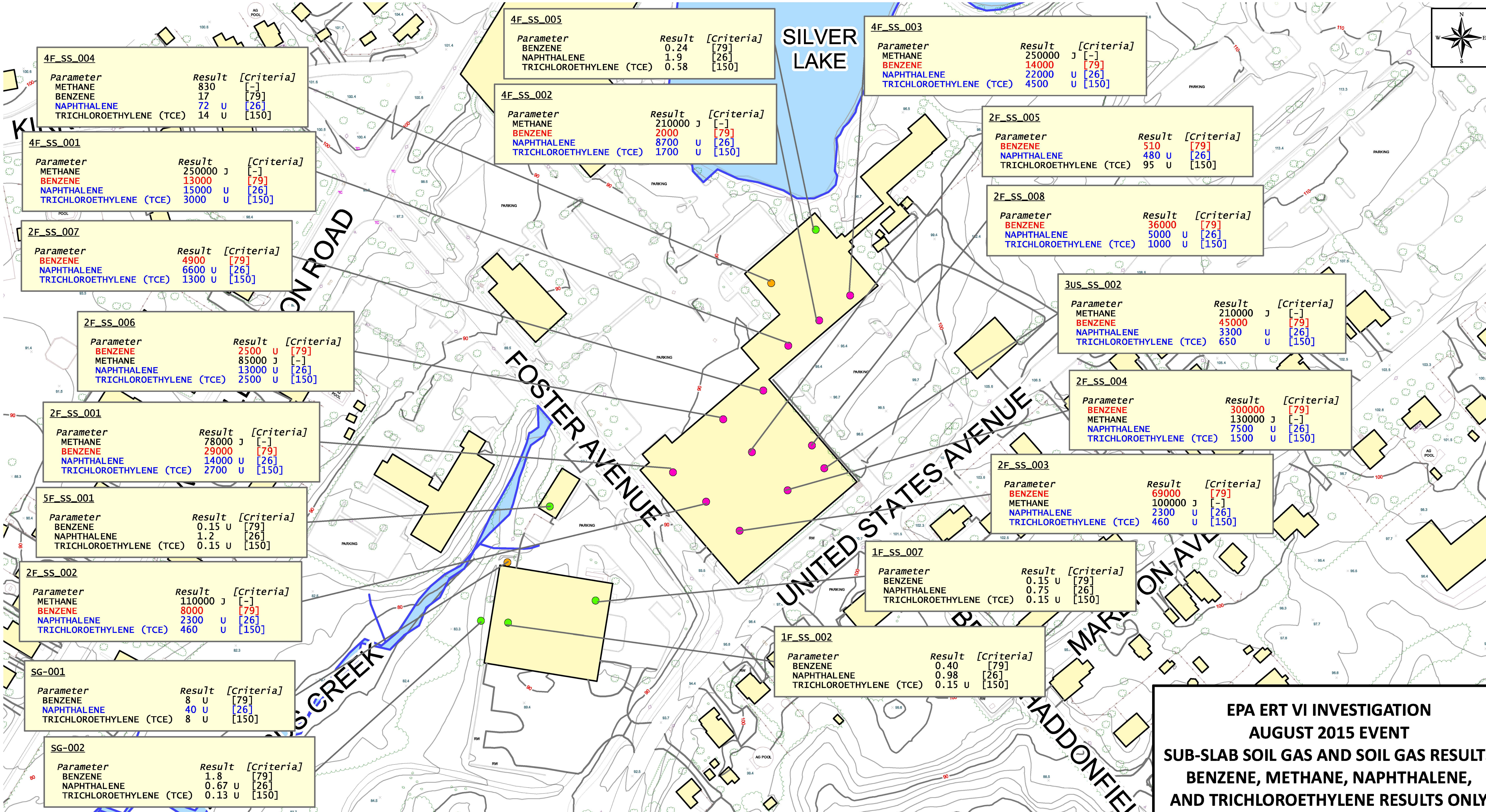
EHS Support
consider it done

Figure 7-3

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\LNAPLthreshFigs.mxd

Printed 3/19/2018 4:53:33 PM by Alex.Smith



Legend

- Sub-Slab Soil Gas Sample Location with Excedance(s)
- Sub-Slab Soil Gas Sample Location with Non-Detect Result Greater than Respective NJDEP NRSGSL Criterion
- Sub-Slab Soil Gas Sample Location with No Exceedance(s)

Notes:
1. All samples were collected by EPA.
2. Benzene, Naphthalene, and Trichloroethylene results are in ug/m³. Methane results are in parts per million by volume (ppmv).
3. All results are compared against the 2013 NJDEP Non-Residential Soil Gas Screening Levels (NRSGSL).
4. U - Undetected Value
5. J - Estimated Value
4. Red text indicates results that exceed NJDEP NRSGSL.
5. Blue text indicates reporting limit that exceeds NJDEP NRSGSL.

140 70 0 140
Graphic Scale In Feet

Figure Source: Remedial Investigation Report, Soil, Sediment, Surface Water, Pore Water and Vapor Intrusion, Sherwin-Williams/Hilliards Creek Superfund Site; Weston, 2018)

EPA ERT VI INVESTIGATION AUGUST 2015 EVENT SUB-SLAB SOIL GAS AND SOIL GAS RESULTS BENZENE, METHANE, NAPHTHALENE, AND TRICHLOROETHYLENE RESULTS ONLY

FORMER MANUFACTURING PLANT LNAPL INVESTIGATION REPORT THE SHERWIN-WILLIAMS COMPANY

EHS Support *consider it done*

FIGURE 8-7

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 8-7 20957_EPA_August_2015_Sub_Slab.mxd

Printed 3/8/2018 2:17:43 PM by Alex.Smith

Figure Source: Remedial Investigation Report, Soil, Sediment, Surface Water, Pore Water and Vapor Intrusion, Sherwin-Williams/Hilliards Creek Superfund Site; Weston, 2018)

Legend
- Locations not Analyzed
- Soil Gas/Ambient Air Sample Location with Exceedance(s)
- Soil Gas/Ambient Air Sample Location with Non-Detect Result Greater than Respective NJDEP NRSGSL Criterion
- Soil Gas/Ambient Air Sample Location with No Exceedance(s)

Notes:
1. All samples were collected by EPA.
2. Benzene, Naphthalene, and Trichloroethylene results are in ug/m^3. Methane results are in parts per million by volume (ppmv).
3. All results are compared against the 2013 NJDEP Non-Residential Soil Gas Screening Levels (NRSGSL).
4. U - Undetected Value
5. Red text indicates results that exceed NJDEP NRSGSL.
6. Blue text indicates reporting limit that exceeds NJDEP NRSGSL.

60 30 0 60
Graphic Scale In Feet

EHS Support
consider it done

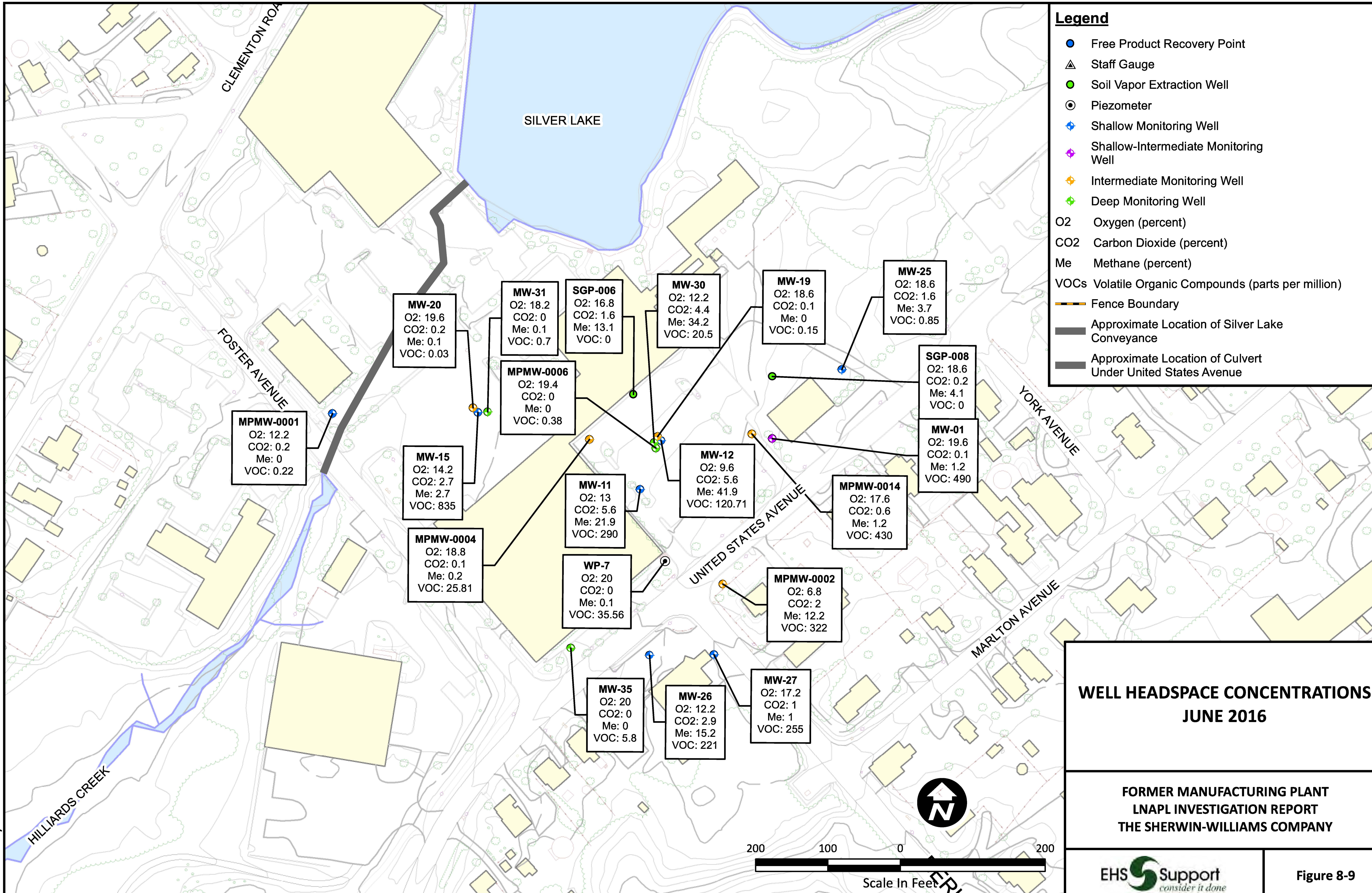
Former Manufacturing Plant
LNAPL Conceptual Site Model
The Sherwin-Williams Company

EPA ERT VI INVESTIGATION
JUNE 2016 EVENT
SOIL GAS RESULTS
BENZENE, METHANE, NAPHTHALENE, AND TRICHLOROETHYLENE ONLY

FIGURE 8-8

J:\EHS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReport\Figure 8-8 20951_EPA_June_2016_Soil_Gas.mxd

Printed 3/8/2018 2:20:35 PM by Alex.Smith



WELL HEADSPACE CONCENTRATIONS JUNE 2016

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

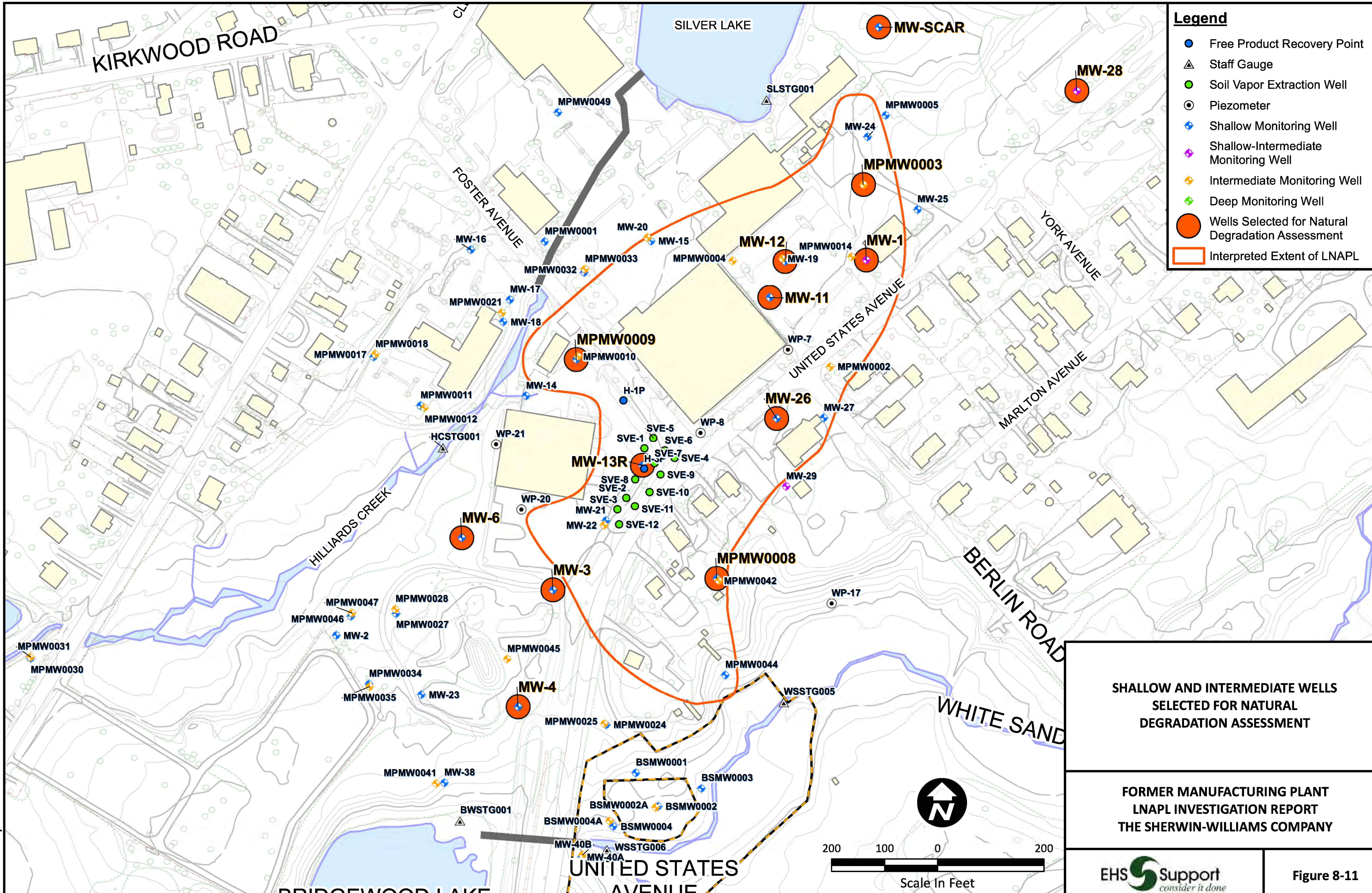
EHS Support consider it done

Figure 8-9

Reviewed By:

J:\EHSS_GIS\C05552_ThePaintCo\01_ANALYSIS\20180110_InvestigationReportSiteFigureSeries.mxd

Printed 3/19/2018 4:38:52 PM by Alex.Smith



SHALLOW AND INTERMEDIATE WELLS SELECTED FOR NATURAL DEGRADATION ASSESSMENT

FORMER MANUFACTURING PLANT
LNAPL INVESTIGATION REPORT
THE SHERWIN-WILLIAMS COMPANY

EHS Support consider it done

Figure 8-11

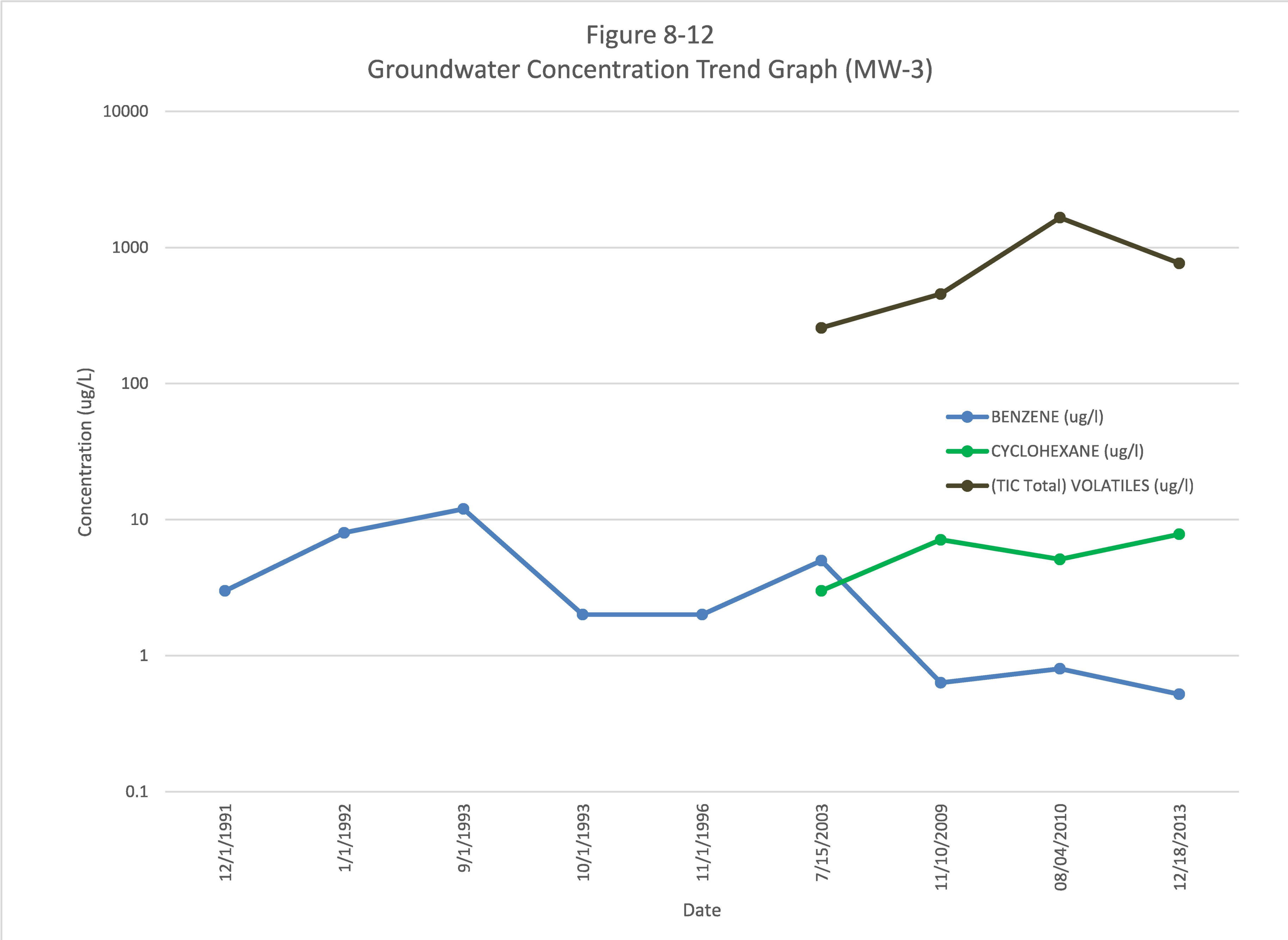


Figure 8-12
Groundwater Concentration Trend Graph (MW-3)
10000
1000
100
10
1
0.1
Concentration (ug/L)
BENZENE (ug/l)
CYCLOHEXANE (ug/l)
(TIC Total) VOLATILES (ug/l)
12/1/1991
1/1/1992
9/1/1993
10/1/1993
11/1/1996
7/15/2003
11/10/2009
08/04/2010
12/18/2013
Date

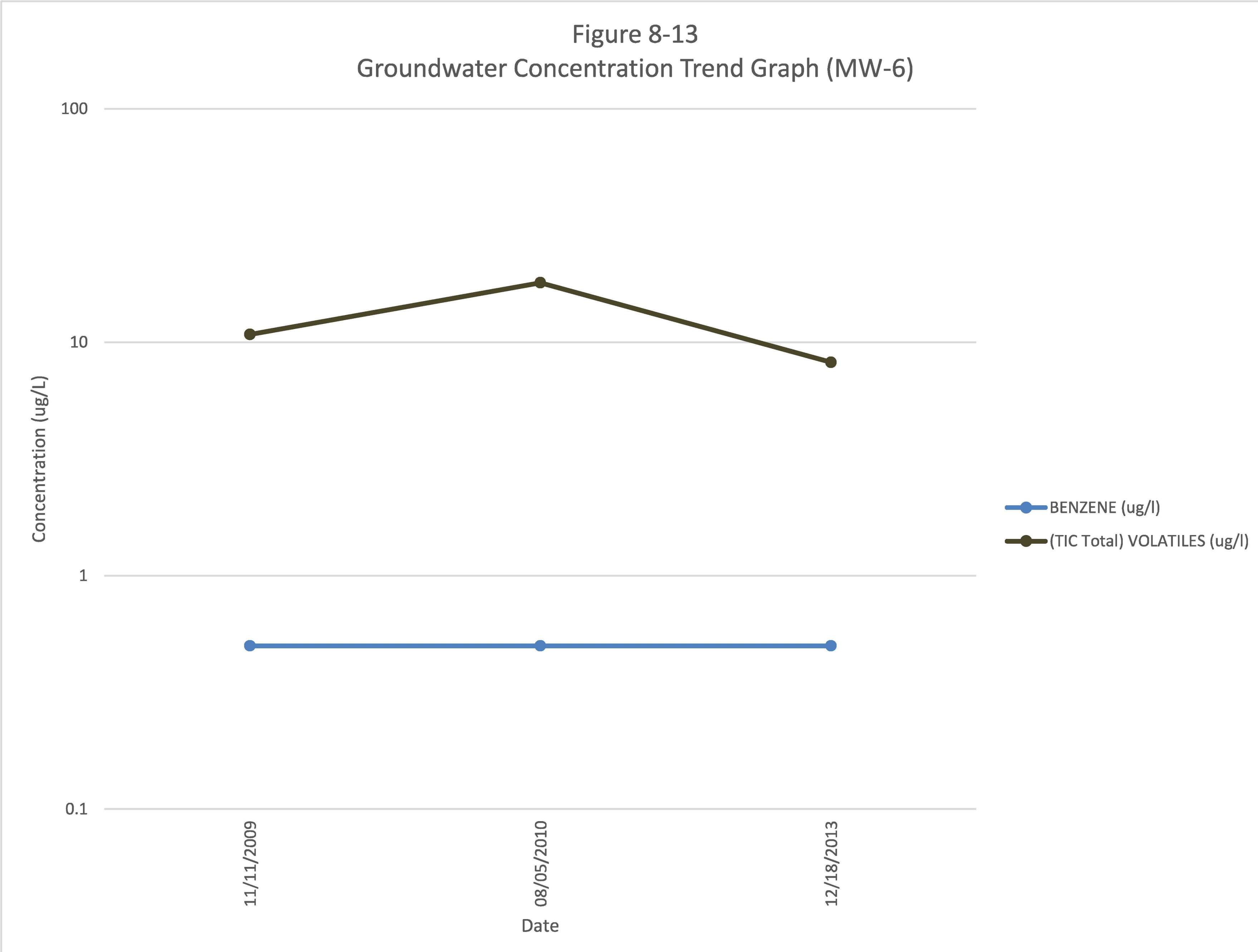
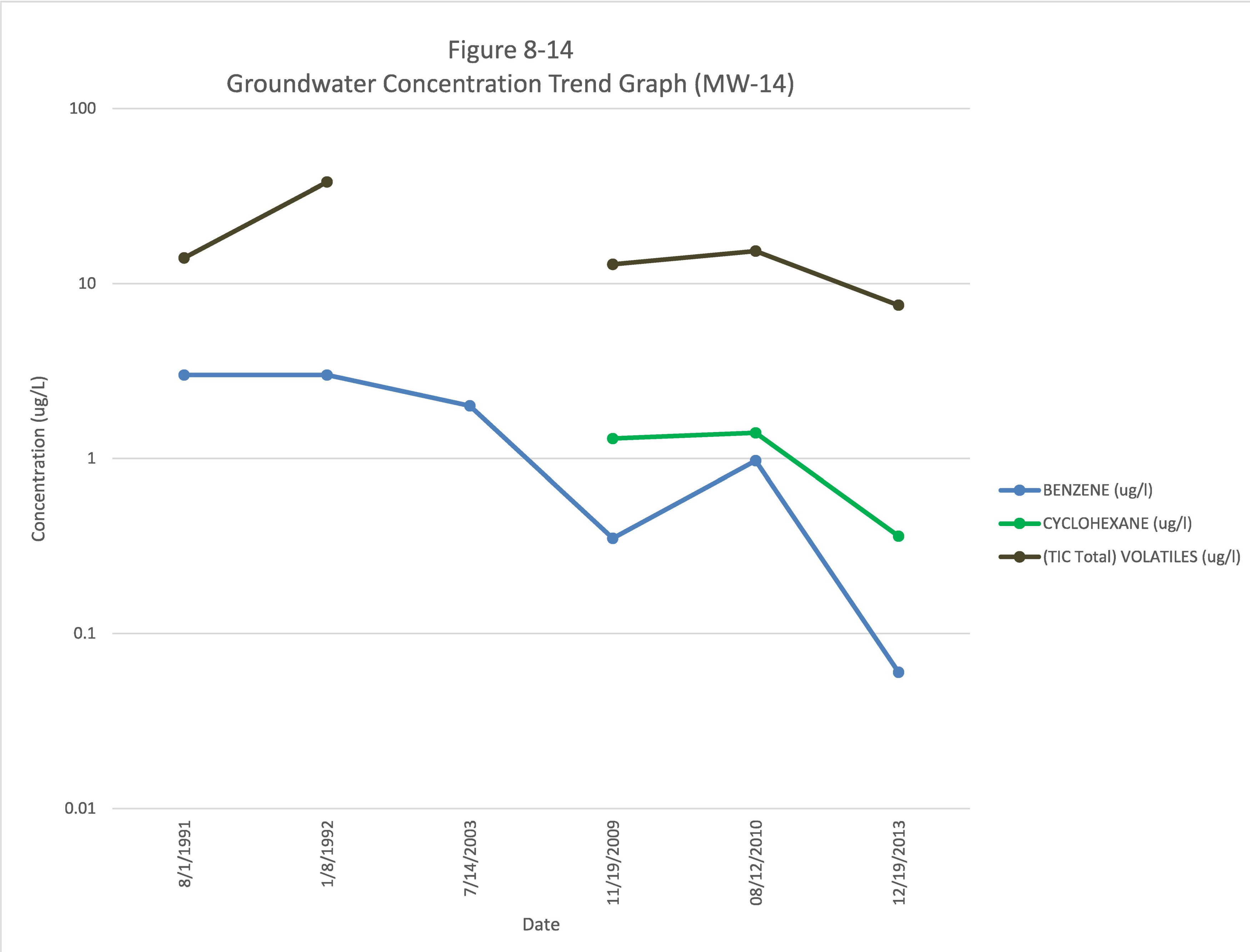


Figure 8-13
Groundwater Concentration Trend Graph (MW-6)
100
10
1
0.1
Concentration (ug/L)
11/11/2009
08/05/2010
12/18/2013
Date
BENZENE (ug/l)
(TIC Total) VOLATILES (ug/l)



EHS Support consider it done

The Sherwin-Williams Company
Gibbsboro, New Jersey

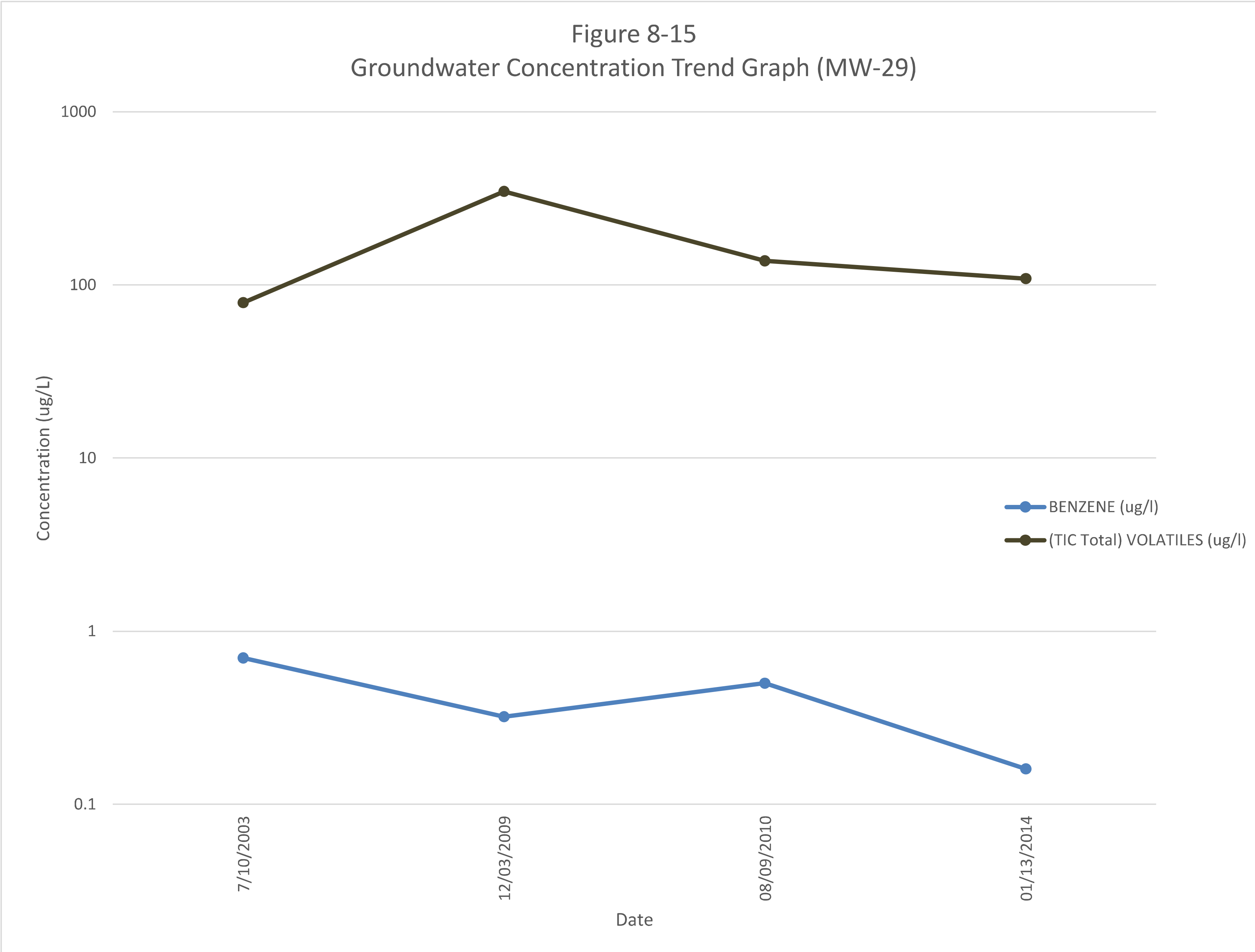


Figure 8-15
Groundwater Concentration Trend Graph (MW-29)
1000
100
10
1
0.1
Concentration (ug/L)
BENZENE (ug/l)
(TIC Total) VOLATILES (ug/l)
7/10/2003
12/03/2009
08/09/2010
01/13/2014
Date

APPENDIX A LNAPL INVESTIGATION PERMITS

BOARD OF CHOSEN FREEHOLDERS
OFFICE OF
PERMIT DEPARTMENT

CAMDEN COUNTY HIGHWAY DEPARTMENT
2311 EGG HARBOR ROAD
LINDENWOLD, NEW JERSEY 08021
(856) 566-2980

A-39604

COUNTY MUST BE NOTIFIED 24 HOURS PRIOR TO MAKING OPENINGS

THIS WORK AUTHORIZED
BY THIS PERMIT SHALL
BECOME VOID IF WORK
HAS NOT COMMENCED
WITHIN 90 DAYS OF ISSUANCE

DATE: September, 14 2017

PERMISSION IS HEREBY GIVEN TO:

NAME: WESTON SOLUTIONS, INC. **PHONE** (856) 782-4935

ADDRESS: 40 E CLEMENTON RD, STE 2, GIBBSBORO, NJ 08026

TO OPEN: CR 561B - FOSTER AVE BTW UNITED STATES & CLEMENTON RD
(2) SOIL BORINGS ASPHALT

IN: GIBBSBORO **TO CONNECT FOR:** SOIL BORING

THE PERSON ACCEPTING THIS PERMIT HEREBY AGREES AND GUARANTEES TO COMPLY WITH THE CONDITIONS AND REGULATIONS SET OUT IN CAMDEN COUNTY PERMIT BOOK.

RECEIVED THE SUM OF: $350.00 **ON ACCOUNT OF THIS PERMIT**

THE HOLDER OF THIS PERMIT HAS COMPLIED WITH ALL THE CONDITIONS, AND IS ENTITLED TO A RETURN OF: $0.00

Kevin Becica

Kevin Becica
Camden County Engineer

COMPLETED:

INSPECTED BY:

PERMIT # A-39604

camden county
Making It Better, Together.

CAMDEN COUNTY DEPARTMENT OF PUBLIC WORKS
2311 EGG HARBOR RD., LINDENWOLD, NJ 08021
PHONE (856) 566-2980 FAX (856) 566-2966

APPLICATION FOR PERMIT

ACCESS FOR: (CIRCLE ONE)

PRIVATE	BUSINESS	SERVICE STATION	UTILITIES

APPLICANT EHS Support, Inc./ Weston Solutions, Inc.
MAILING ADDRESS 40 East Clementon Road
CITY Gibbsboro STATE NJ ZIP 08026
PHONE ( ) 856-346-2046 FAX ( ) 856-782-4930

EMERGENCY CONTACT (24 hr notification) Sarah Hale; Weston Solutions, Inc.
MAILING ADDRESS 205 Campus Drive
CITY Edison STATE NJ ZIP 08837
PHONE ( ) 732-429-6217 FAX ( ) 856-782-4930

ENGINEERING/PLANNING BOARD INFORMATION
PLATE# BLOCK# LOT#
PLANNING REFERENCE #:
PLANNING BOARD APPROVAL DATE: (ATTACH COPY OF APPROVAL LETTER)

INSURANCE COMPANY Admiral Insurance Company
POLICY# FEI-ECC-16307-04
PERFORMANCE BOND/L.O.C. COMPANY
POLICY# PHONE#
PURPOSE OF OPENING: soil borings (2)
COUNTY ROAD Foster Ave CR# 561
MUNICIPALITY: Gibbsboro
SIZE OF OPENING: 2-inches
TYPE OF PAVING SURFACE: asphalt

DEPARTMENT USE ONLY	
DATE ISSUED:	9-14-17
PERMIT FEE:	#350.00
REFUND:	
CHECK #	283154
BOND	
SPECIAL REQUIREMENTS:	
INFRARED	
REPLACE AND RE-WELD REINFORCEMENT STEEL	
INSPECTOR	Wallace
PER-DIEM INSPECTOR	
PERFORMANCE BOND RECEIVED	
CIRCLE ONE BOND L.O.C. CHECK	

LOCATION (GIVE EXACT LOCATION TO DISTINCT LANDMARKS,IE. INTERSECTIONS, BRIDGES, ETC.)

Please See Attached Figures

NJ LAW (N.J.S.A. 48:2-73 REQUIRES PROOF THAT NJ ONE-CALL (1-800-272-1000) HAS BEEN NOTIFIED PRIOR TO ISSUING A PERMIT.
CONFIRMATION NUMBER(S) ASSIGNED 172492853

DATE WORK WILL START ON 9/20/2017 ANTICIPATED COMPLETION DATE 9/20/2017

REMARKS schedule is subject to change pending weather and/or field conditions

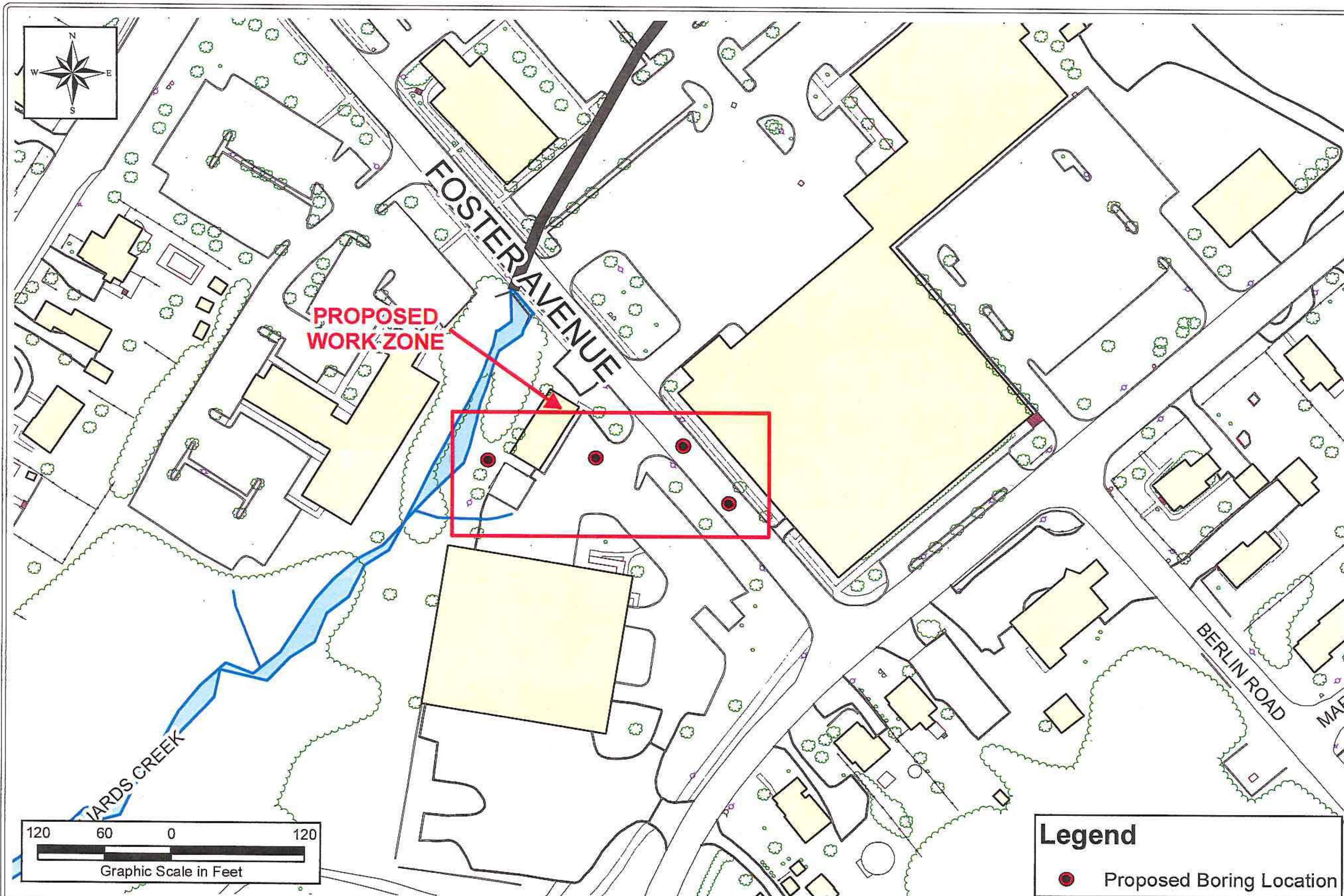
THE APPLICANT AGREES TO COMPLY WITH THE REGULATIONS CONTAINED IN THE ORDINANCE GOVERNING ROADS AND STREET OPENINGS IN THE COUNTY OF CAMDEN AS WELL AS ALL LAWS, ORDINANCES AND RESOLUTIONS RELATING TO SAID WORK AND THE ACCEPTANCE OF THE PERMIT SHALL BE DEEMED AN AGREEMENT TO ABIDE BY ALL OF ITS TERMS AND CONDITIONS.

SIGNED BY APPLICANT Sarah Hale NAME PRINTED Sarah Hale DATE 9/13/17

THIS PERMIT IS EFFECTIVE FOR 90 DAYS AFTER THE DATE OF ISSUANCE

YOU ARE HERBY GRANTED PERMISSION TO MAKE OPENING IN THE THE COUNTY ROAD ROAD AND PERFORM WORK AND INSTALL FACILITIES THEREIN, IN ACCORDANCE WITH THE PLANS ATTACHED AND REGULATIONS PERTAINING THERETO.

AUTHORIZED SIGNATURE Kevin Becica
Kevin Becica
Camden County Engineer
TITLE DATE 9/14/17



L:\SHERWIN\GIS\MXD\2017_07_Traffic_Control\20801_Foster_Monitoring_Well_Locs.mxd

WESTON SOLUTIONS

DATE: September 2017

FIGURE #: 1

PROJECT: Sherwin-Williams Gibbsboro

CLIENT NAME: The Sherwin-Williams Company

TITLE: PROPOSED BORING LOCATION

New Jersey State Department of Environmental Protection
Bureau of Water Allocation and Well Permitting
Mail Code 401-04Q PO BOX 420 Trenton, NJ 08625-0420 Tel: 609-984-6831

Well Permit Number
E201710063

WELL PERMIT

New Well

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit

Certifying Driller: THOMAS CARPENTER, LICENSE # 643790

Permit Issued to: CONETEC INC

Company Address: 436 COMMERCE LN UNIT C WEST BERLIN, NJ 08091

PROPERTY OWNER

Name: BRANDYWINE OPERAT/ LLC %TAX ADMIN

Organization: Brandywine

Address: 555 E Lancastor Ave. #100

City: Radnor State: Pennsylvania Zip Code: 19087

PROPOSED WELL LOCATION

Facility Name: Sherwin-Williams Plant

Address: United States Ave

County: Camden Municipality: Gibbsboro Boro Lot: 1, 1.07, 3.05, 3.06, 4 Block: 19.01, 8.01

Easting (X): 362232 , Northing (Y): 365776
Coordinate System: NJ State Plane (NAD83) - USFEET

Local ID: LIF 1- 8

SITE CHARACTERISTICS

PROPOSED CONSTRUCTION

WELL USE: BORING/SITE WIDE

Other Use(s):

Diameter (in.): 1.75

Regulatory Program Requiring Wells/Borings:

Depth (ft.): 100

Case ID Number:

Pump Capacity (gpm): 0

Deviation Requested: N

Drilling Method: Direct Push Probe

Attachments:

SPECIFIC CONDITIONS/REQUIREMENTS

Approval Date: September 5, 2017
Expiration Date: September 5, 2018

Approved by the authority of:
Bob Martin
Commissioner

Terry D. Pilawski
Terry Pilawski, Chief
Bureau of Water Allocation and Well Permitting

APPENDIX B 2017 CPT/MIP INVESTIGATION REPORT

PRESENTATION OF SITE INVESTIGATION RESULTS

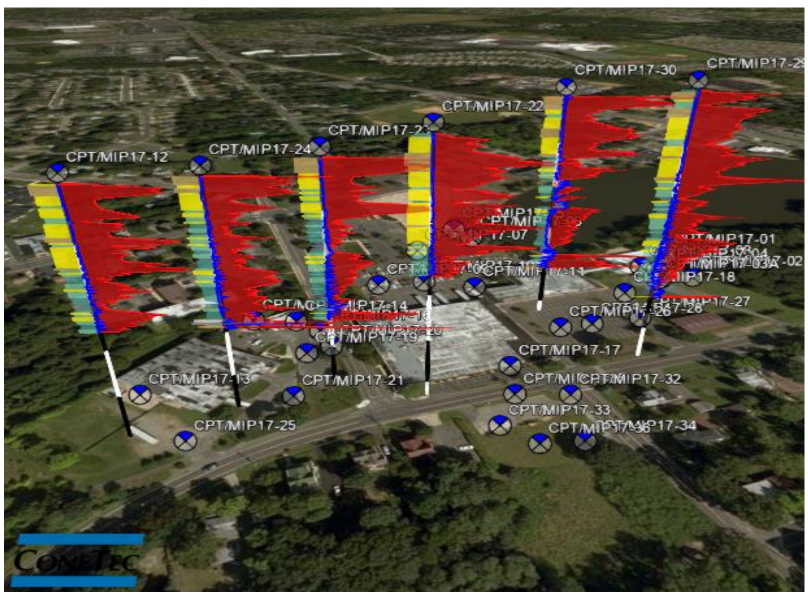
The Paint Company
Gibbsboro, New Jersey

Prepared for:

EHS Support

ConeTec Job No: 17-53125

Project Start Date: 19-Sep-2017
Project End Date: 29-Sep-2017
Revised Report Date: 20-Oct-2017



Prepared by:

ConeTec Inc.
436 Commerce Lane, Unit C
West Berlin, NJ 08091

Tel: (856) 767-8600
Fax: (856) 767-4008
Toll Free: (800) 504-1116

Email: conetecNJ@conetec.com
www.conetec.com
www.conetecdataservices.com

Introduction

The enclosed report presents the results of a piezocone penetration testing (CPTu or CPT) and Membrane Interface Probe (MIP) program carried out at The Paint Company's superfund site located in Gibbsboro, New Jersey. The CPT site investigation program was conducted by ConeTec Inc. (ConeTec), under contract to EHS Support, LLC of Pittsburgh, Pennsylvania. The MIP investigation program was conducted by ASC Tech Services (ASC); ASC was a subcontractor to ConeTec.

A total of 36 cone penetration tests and 35 MIP tests were completed at 35 locations (there was 1 shallow refusal that was offset and reattempted to be pushed to depth). The CPT program was performed to evaluate the subsurface soil conditions. CPT sounding locations were selected and numbered under supervision of EHS personnel (Mr. Rick Henterly).

Project Information

Project	
Client	EHS Support, LLC
Project	The Paint Company, Gibbsboro, NJ
ConeTec project number	17-53125

A map from CESIUM including the CPT test locations is presented below.

Rig Description	Deployment System	Test Type
CPT Truck Rig	25 ton truck mounted (twin cylinders)	MIP-CPT

Coordinates		
Test Type	Collection Method	EPSG Number
MIP-CPT	GPS (GlobalSat MR-350)	32618 (WGS 84 / UTM North)

Cone Penetration Test (CPT)	
Depth reference	Ground surface at the time of the investigation.
Tip and sleeve data offset	0.1 meter. This has been accounted for in the CPT data files.
Pore pressure dissipation (PPD) tests	Fifty eight pore pressure dissipation tests were completed to determine the phreatic surface.
Additional Comments	A Membrane Interface Probe (MIP) was advanced in conjunction with the cone penetrometer. The MIP system was owned and operated by ACS Tech Services (ASC), a subcontractor to ConeTec. ACS's report and results are located in the MIP Report and Logs appendix.

Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
361:T1500F15U500	361	15	225	1500	15	500

Limitations

This report has been prepared for the exclusive use of EHS Support, LLC (Client) for the project titled "The Paint Company, Gibbsboro, NJ". The report's contents may not be relied upon by any other party without the express written permission of ConeTec. ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

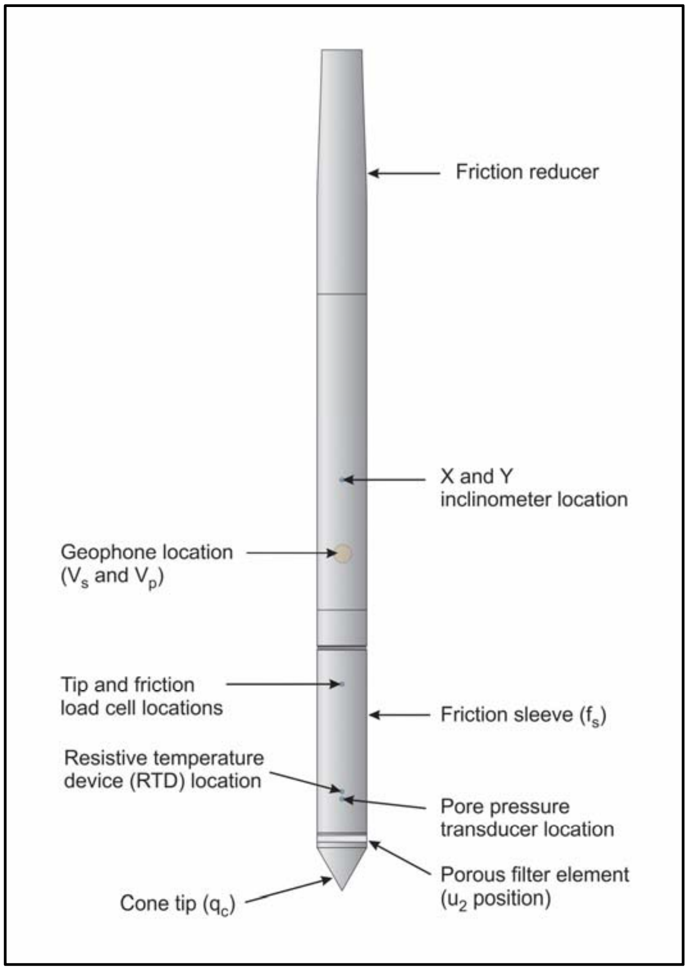


Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1-a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is included in an appendix.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

References

ASTM D5778-12, 2012, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM, West Conshohocken, US.

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, “Cone Penetration Testing in Geotechnical Practice”, Blackie Academic and Professional.

Mayne, P.W., 2013, “Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests”, Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420.

Mayne, P.W. and Peuchen, J., 2012, “Unit weight trends with cone resistance in soft to firm clays”, Geotechnical and Geophysical Site Characterization *4,* Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, “Interpretation of geotechnical parameters from seismic piezocone tests”, CPT’14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, “Use of Piezometer Cone Data”, Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 1990, “Soil Classification Using the Cone Penetration Test”, Canadian Geotechnical Journal, Volume 27: 151-158.

Robertson, P.K., 2009, “Interpretation of cone penetration tests – a unified approach”, Canadian Geotechnical Journal, Volume 46: 1337-1355.

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

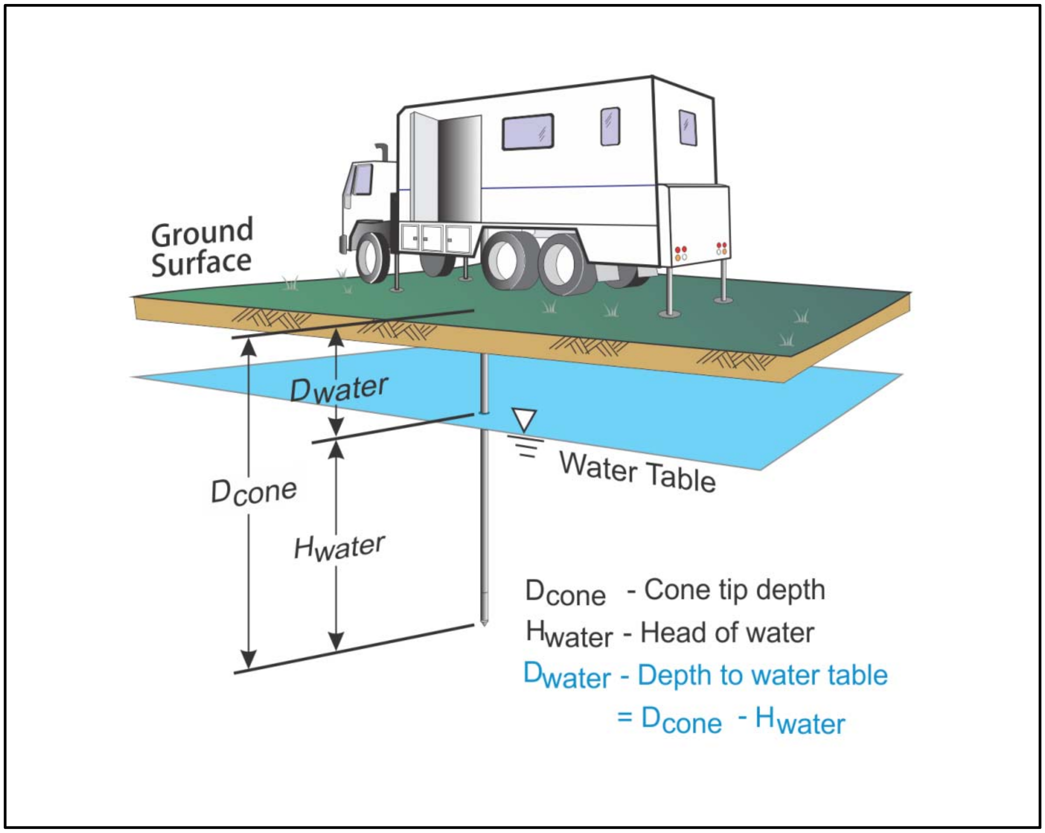


Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

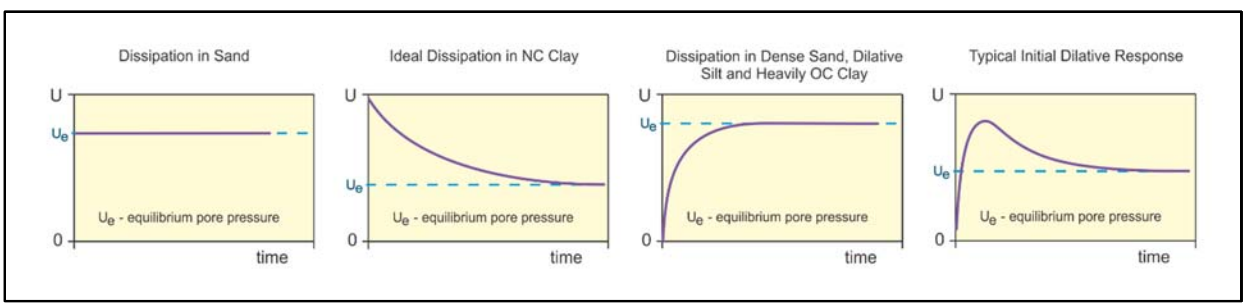


Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T*	is the dimensionless time factor (Table Time Factor)
a	is the radius of the cone
I_r	is the rigidity index
t	is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

References

Burns, S.E. and Mayne, P.W., 1998, “Monotonic and dilatory pore pressure decay during piezocone tests”, Canadian Geotechnical Journal 26 (4): 1063-1073.

Burns, S.E. and Mayne, P.W., 2002, “Analytical cavity expansion-critical state model cone dissipation in fine-grained soils”, Soils & Foundations, Vol. 42(2): 131-137.

Jones, G.A. and Van Zyl, D.J.A., 1981, “The piezometer probe: a useful investigation tool”, Proceedings, 10th International Conference on Soil Mechanics and Foundation Engineering, Vol. 3, Stockholm: 489-495.

Robertson, P.K., Sully, J.P., Woeller, D.J., Lunne, T., Powell, J.J.M. and Gillespie, D.G., 1992, “Estimating coefficient of consolidation from piezocone tests”, Canadian Geotechnical Journal, 29(4): 551-557.

Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, “An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils”, Canadian Geotechnical Journal, 36(2): 369-381.

Teh, C.I., and Houlsby, G.T., 1991, “An analytical study of the cone penetration test in clay”, Geotechnique, 41(1): 17-34.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots
- Membrane Interface Probe (MIP) Logs

Cone Penetration Test Summary and

Standard Cone Penetration Test Plots

ConeTec

CONETEC

Job No: 17-53125
Client: EHS Support
Project: The Paint Company, Gibbsboro, NJ
Start Date: 19-Sep-2017
End Date: 29-Sep-2017

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Northing[2] (m)	Easting (m)	Refer to Notation Number
CPT/MIP17-01	17-53125_CP01	19-Sep-2017	361:T1500F15U500	10.1	32.97	4409734	503230	
CPT/MIP17-02	17-53125_CP02	19-Sep-2017	361:T1500F15U500	13.6	28.71	4409704	503246	
CPT/MIP17-03	17-53125_CP03	19-Sep-2017	361:T1500F15U500	10.8	1.39	4409695	503231	4
CPT/MIP17-03A	17-53125_CP03A	19-Sep-2017	361:T1500F15U500	10.8	33.63	4409693	503229	
CPT/MIP17-04	17-53125_CP04	20-Sep-2017	361:T1500F15U500	9.8	32.32	4409708	503228	
CPT/MIP17-05	17-53125_CP05	20-Sep-2017	361:T1500F15U500	9.5	20.59	4409730	503104	
CPT/MIP17-06	17-53125_CP06	20-Sep-2017	361:T1500F15U500	7.1	17.47	4409721	503118	
CPT/MIP17-07	17-53125_CP07	20-Sep-2017	361:T1500F15U500	4.3	34.45	4409688	503095	
CPT/MIP17-08	17-53125_CP08	20-Sep-2017	361:T1500F15U500	8.6	36.58	4409710	503219	
CPT/MIP17-09	17-53125_CP09	21-Sep-2017	361:T1500F15U500	4.9	13.78	4409634	503094	
CPT/MIP17-10	17-53125_CP10	21-Sep-2017	361:T1500F15U500	3.5	15.42	4409645	503115	
CPT/MIP17-11	17-53125_CP11	21-Sep-2017	361:T1500F15U500	4.5	21.65	4409647	503142	
CPT/MIP17-12	17-53125_CP12	21-Sep-2017	361:T1500F15U500	7.7	42.81	4409484	503061	
CPT/MIP17-13	17-53125_CP13	21-Sep-2017	361:T1500F15U500	7.8	42.49	4409503	503049	
CPT/MIP17-14	17-53125_CP14	22-Sep-2017	361:T1500F15U500	3.2	43.39	4409580	503075	
CPT/MIP17-15	17-53125_CP15	22-Sep-2017	361:T1500F15U500	2.4	45.60	4409575	503055	
CPT/MIP17-16	17-53125_CP16	22-Sep-2017	361:T1500F15U500	3.4	46.92	4409575	503091	
CPT/MIP17-17	17-53125_CP17	22-Sep-2017	361:T1500F15U500	14.8	27.64	4409575	503179	
CPT/MIP17-18	17-53125_CP18	25-Sep-2017	361:T1500F15U500	9.4	20.92	4409669	503215	
CPT/MIP17-19	17-53125_CP19	25-Sep-2017	361:T1500F15U500	2.7	42.81	4409554	503095	
CPT/MIP17-20	17-53125_CP20	25-Sep-2017	361:T1500F15U500	3.8	45.44	4409564	503102	
CPT/MIP17-21	17-53125_CP21	25-Sep-2017	361:T1500F15U500	2.8	45.19	4409523	503107	
CPT/MIP17-22	17-53125_CP22	26-Sep-2017	361:T1500F15U500	13.5	42.65	4409549	503152	
CPT/MIP17-23	17-53125_CP23	26-Sep-2017	361:T1500F15U500	3.5	54.46	4409547	503112	
CPT/MIP17-24	17-53125_CP24	26-Sep-2017	361:T1500F15U500	4.2	47.74	4409516	503087	

Job No: 17-53125
Client: EHS Support
Project: The Paint Company, Gibbsboro, NJ
Start Date: 19-Sep-2017
End Date: 29-Sep-2017

CONE PENETRATION TEST SUMMARY

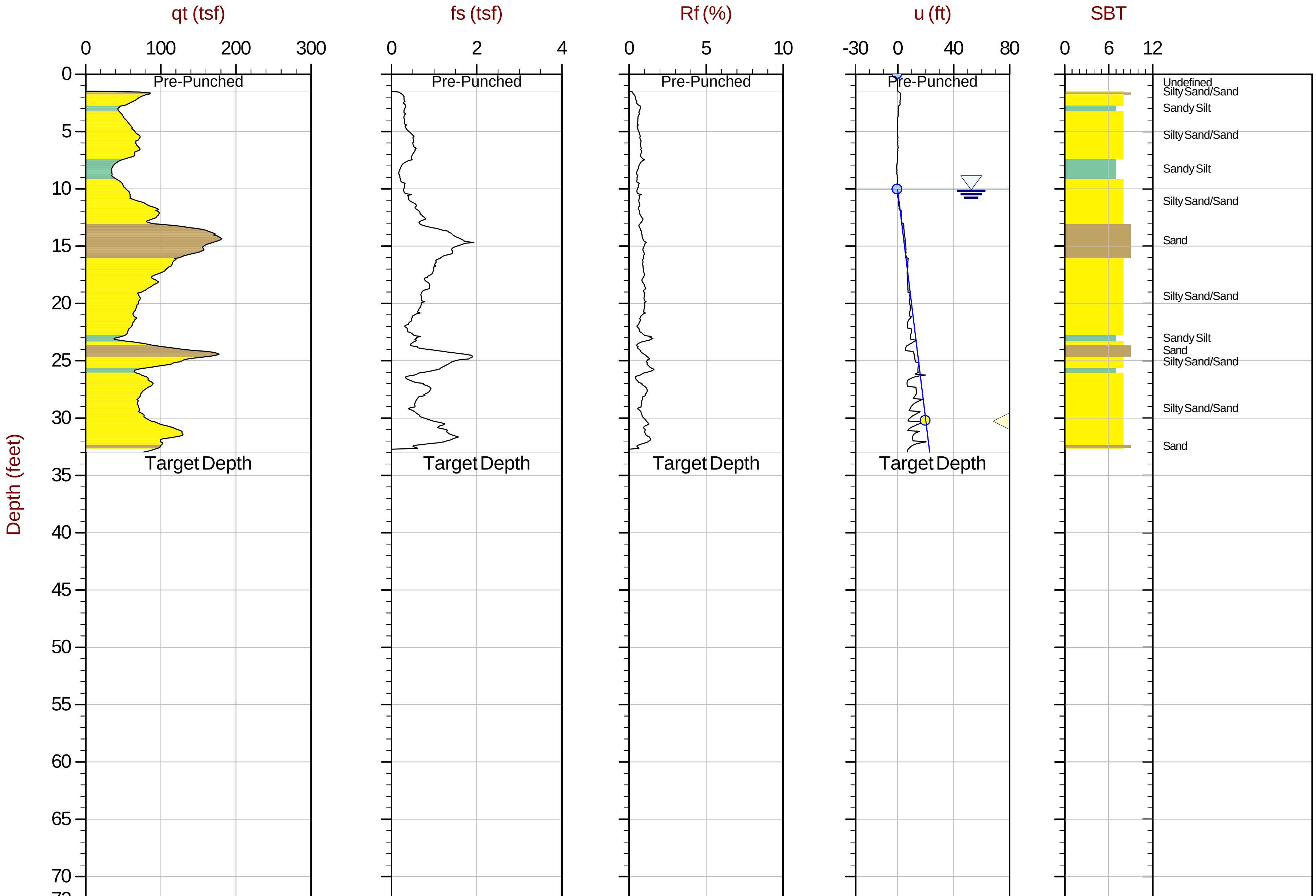
Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Northing[2] (m)	Easting (m)	Refer to Notation Number
CPT/MIP17-25	17-53125_CP25	26-Sep-2017	361:T1500F15U500	12.7	42.57	4409484	503085	
CPT/MIP17-26	17-53125_CP26	27-Sep-2017	361:T1500F15U500	12.6	62.99	4409617	503192	
CPT/MIP17-27	17-53125_CP27	27-Sep-2017	361:T1500F15U500	13.2	66.11	4409641	503225	
CPT/MIP17-28	17-53125_CP28	27-Sep-2017	361:T1500F15U500	13.0	64.39	4409627	503205	
CPT/MIP17-29	17-53125_CP29	28-Sep-2017	361:T1500F15U500	17.3	69.47	4409612	503226	
CPT/MIP17-30	17-53125_CP30	28-Sep-2017	361:T1500F15U500	10.9	66.52	4409643	503176	
CPT/MIP17-32	17-53125_CP32	29-Sep-2017	361:T1500F15U500	15.3	27.56	4409562	503206	
CPT/MIP17-33	17-53125_CP33	29-Sep-2017	361:T1500F15U500	16.0	27.23	4409532	503186	
CPT/MIP17-34	17-53125_CP34	29-Sep-2017	361:T1500F15U500	18.0	28.38	4409534	503216	
CPT/MIP17-35	17-53125_CP35	29-Sep-2017	361:T1500F15U500	14.2	27.40	4409554	503186	
CPT/MIP17-36	17-53125_CP36	29-Sep-2017	361:T1500F15U500	14.9	27.40	4409527	503202	
Totals	36 soundings				1347.01			

1. Assumed phreatic surface depths were determined from the pore pressure data unless otherwise noted. Hydrostatic data were used for calculated parameters.
2. Coordinates are WGS 84 / UTM Zone 18 and were collected using a MR-350 GlobalSat GPS Receiver.
3. Assumed phreatic surface estimated from the dynamic pore pressure response.
4. No phreatic surface detected

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-19 11:35
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-01
Cone: 361:T1500F15U500



Max Depth: 10.050 m / 32.97 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP01.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409734m E: 503230m

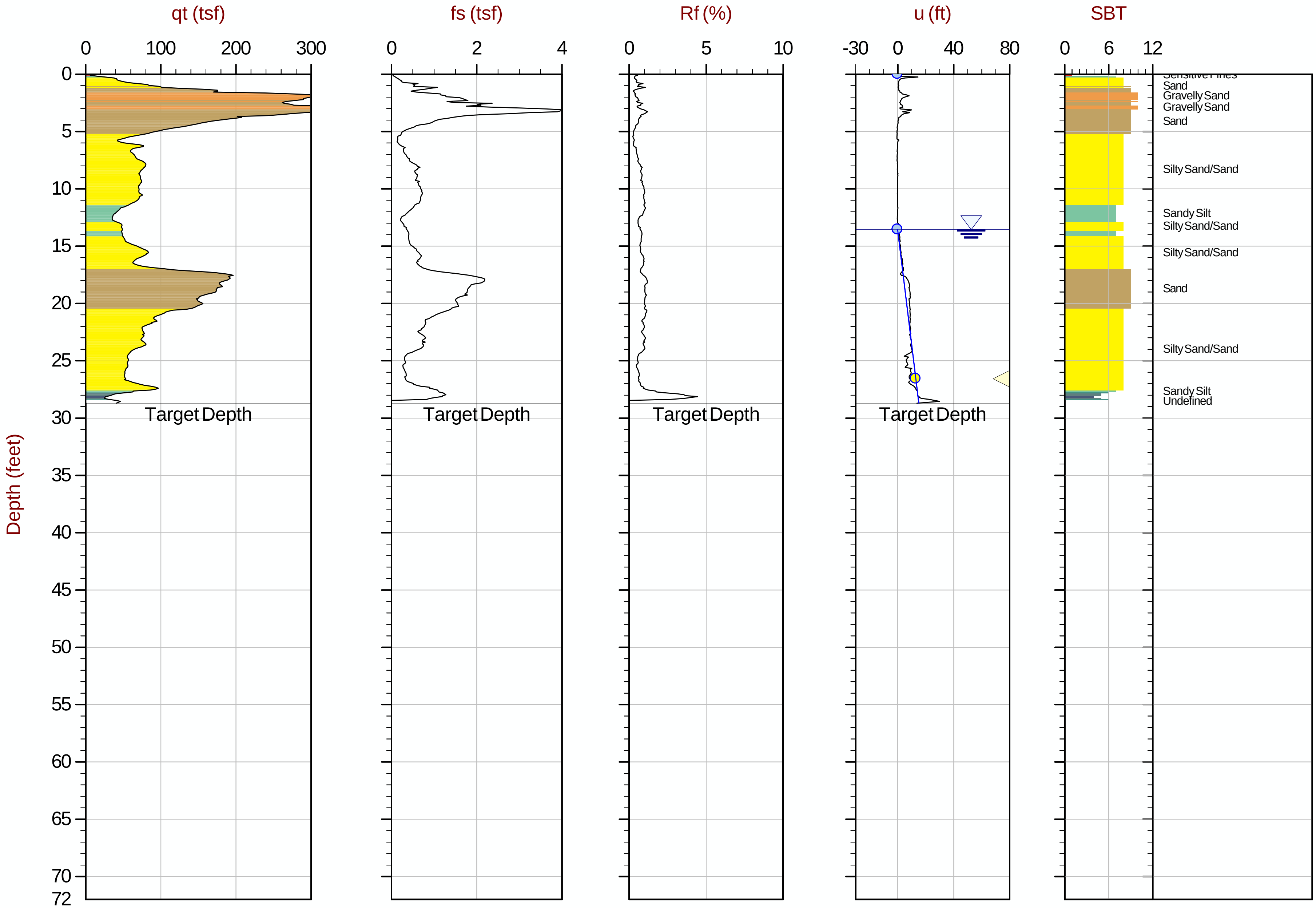
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-19 13:42
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-02
Cone: 361:T1500F15U500



Max Depth: 8.750 m / 28.71 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP02.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409704m E: 503246m

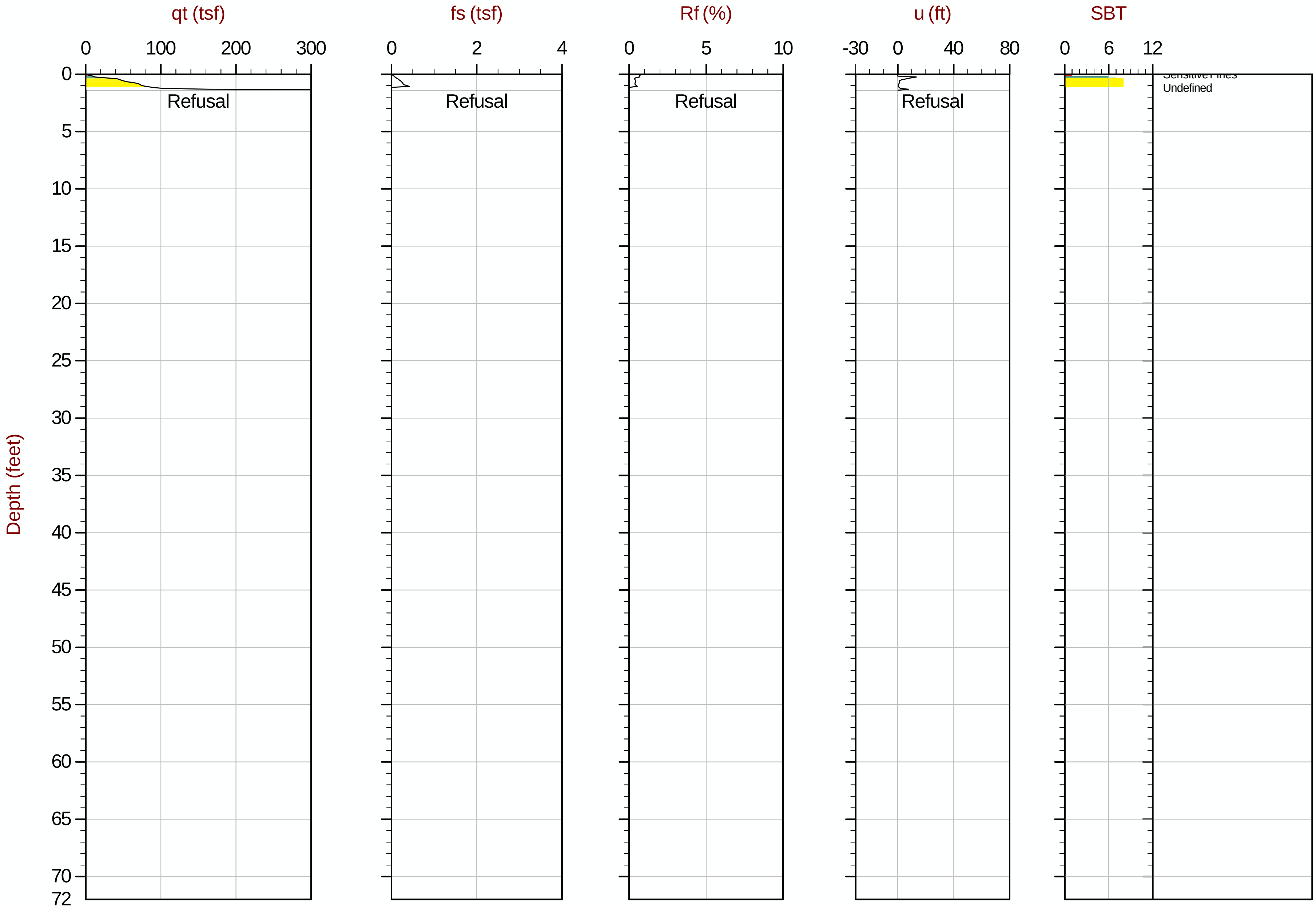
Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-19 15:08
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-03
Cone: 361:T1500F15U500



Max Depth: 0.425 m / 1.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP03.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409695m E: 503230m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

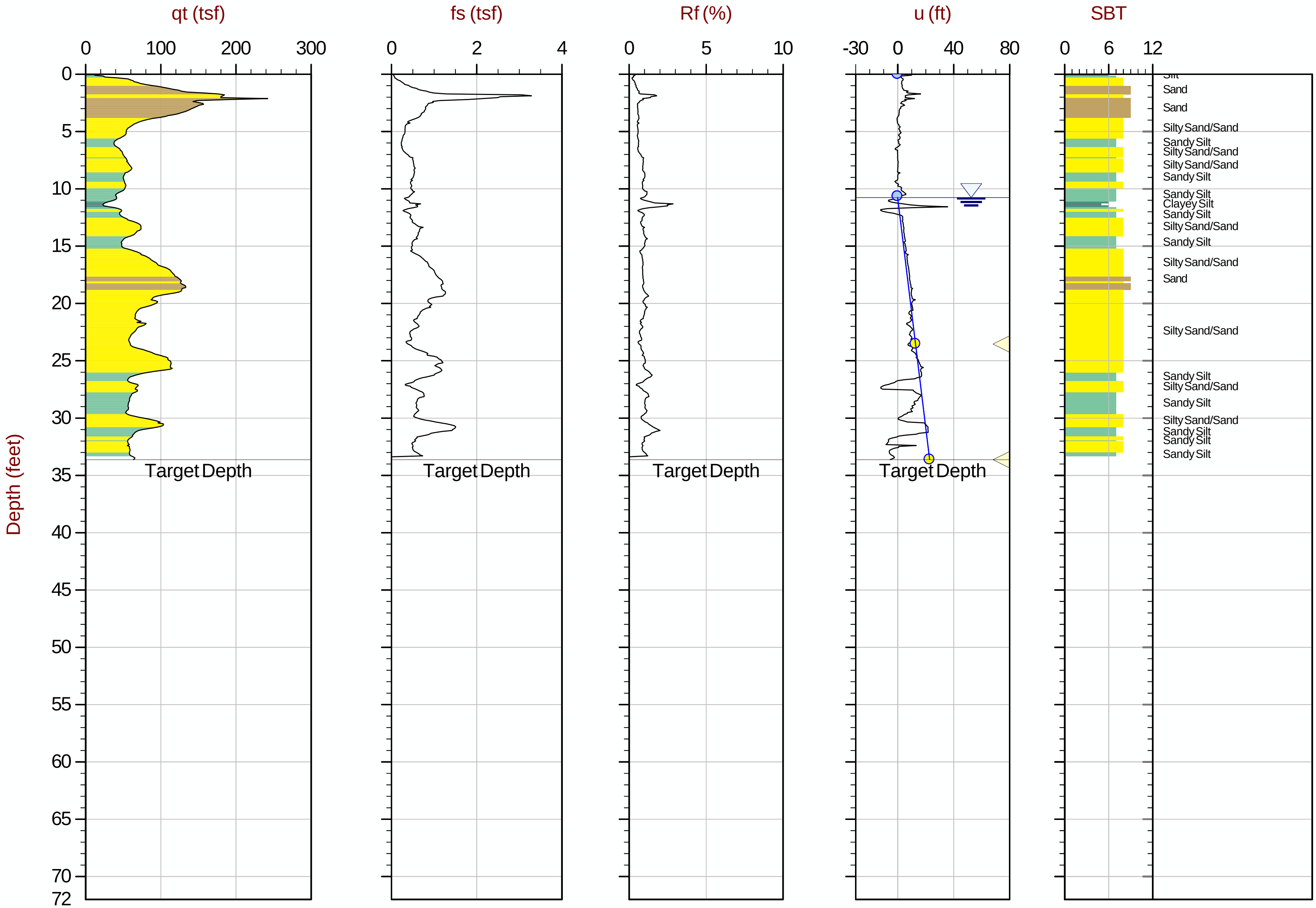
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-19 15:31
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-03A
Cone: 361:T1500F15U500



Max Depth: 10.250 m / 33.63 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP03A.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409693m E: 503229m

Hydrostatic Line · Ueq · Assumed Ueq · PPD, Ueq achieved · PPD, Ueq not achieved

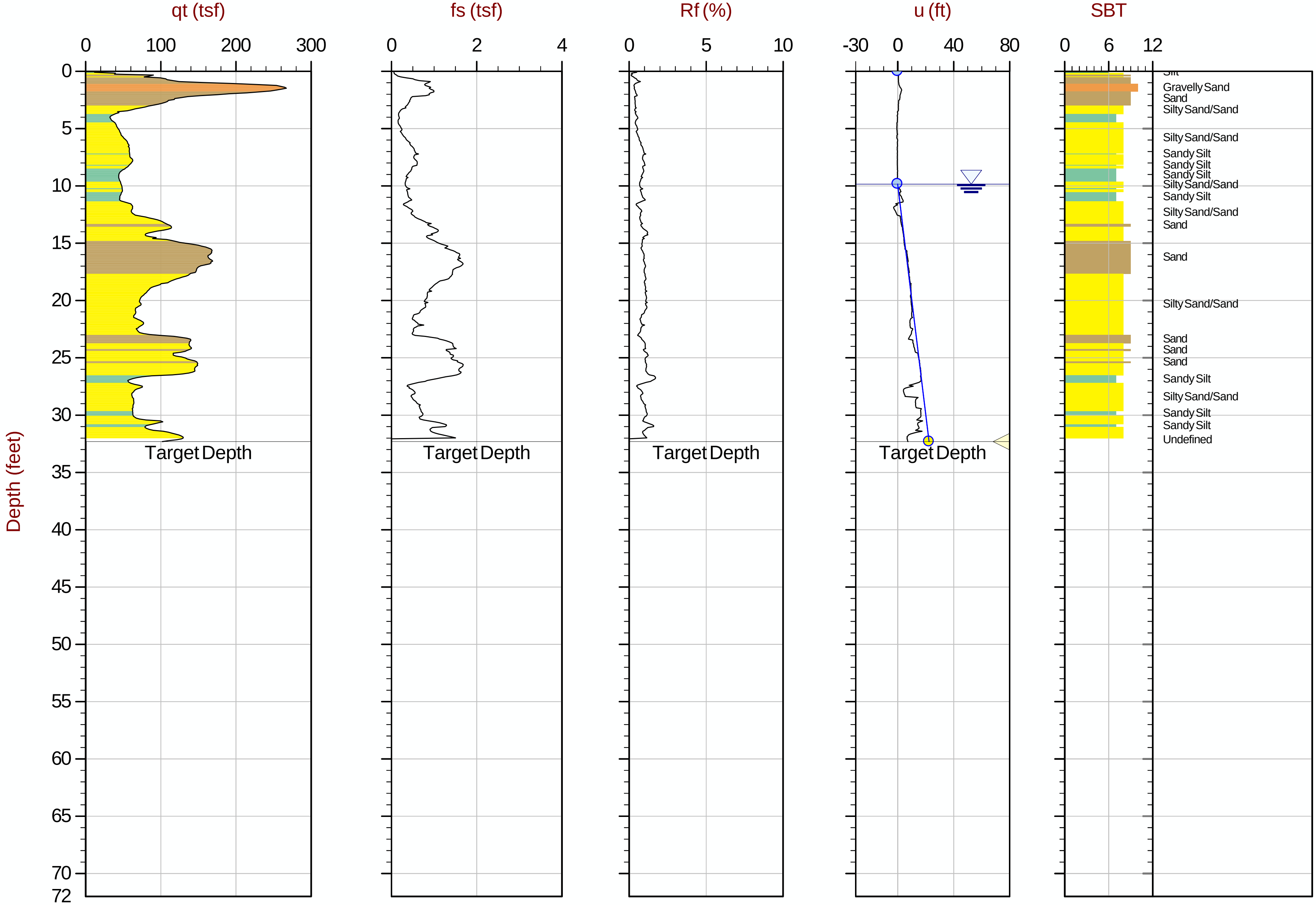
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-20 08:48
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-04
Cone: 361:T1500F15U500



Max Depth: 9.850 m / 32.32 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP04.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409708m E: 503228m

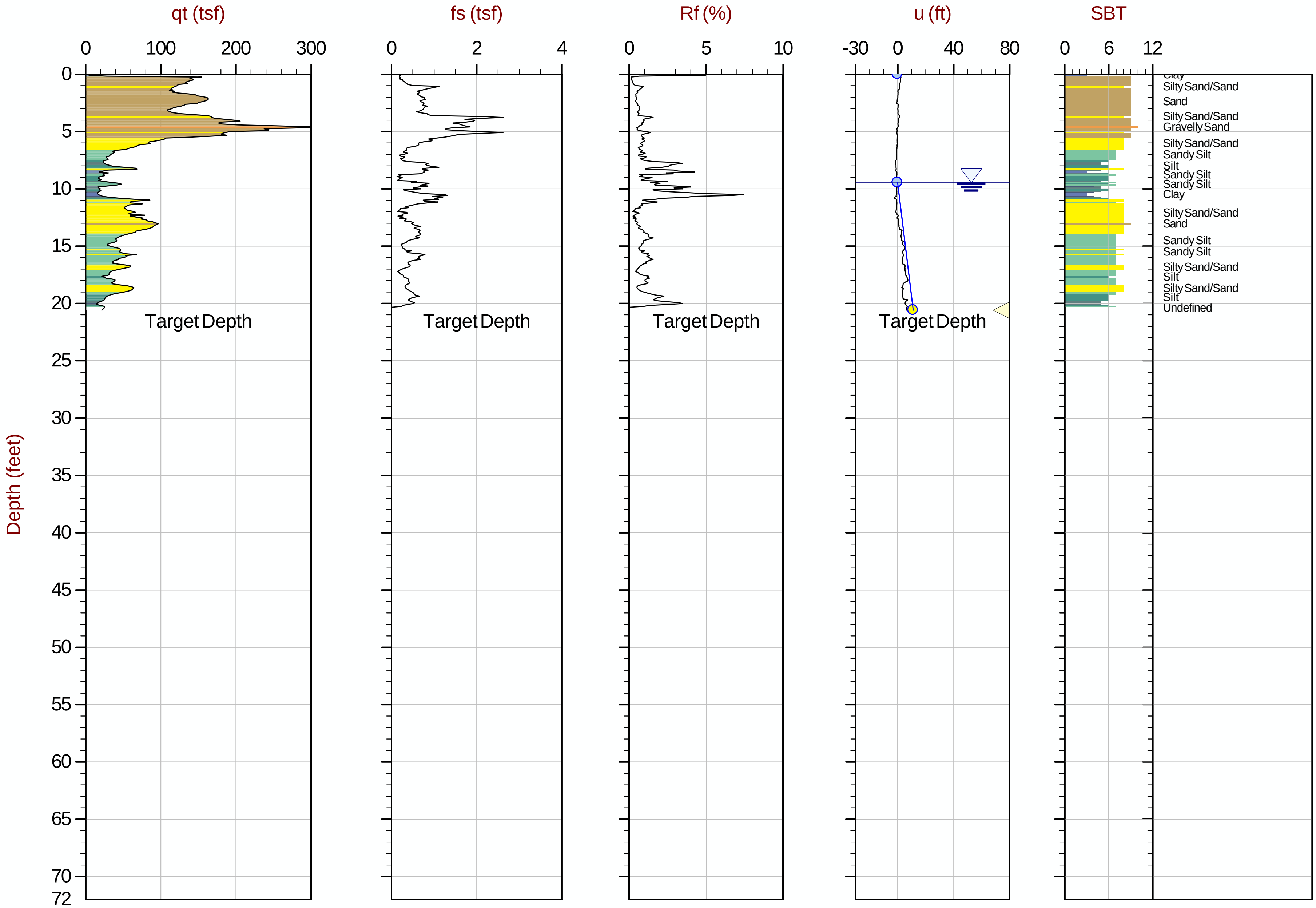
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Job No: 17-53125
Date: 2017-09-20 10:52
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-05
Cone: 361:T1500F15U500

EHS Support



Max Depth: 6.275 m / 20.59 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP05.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409730m E: 503104m

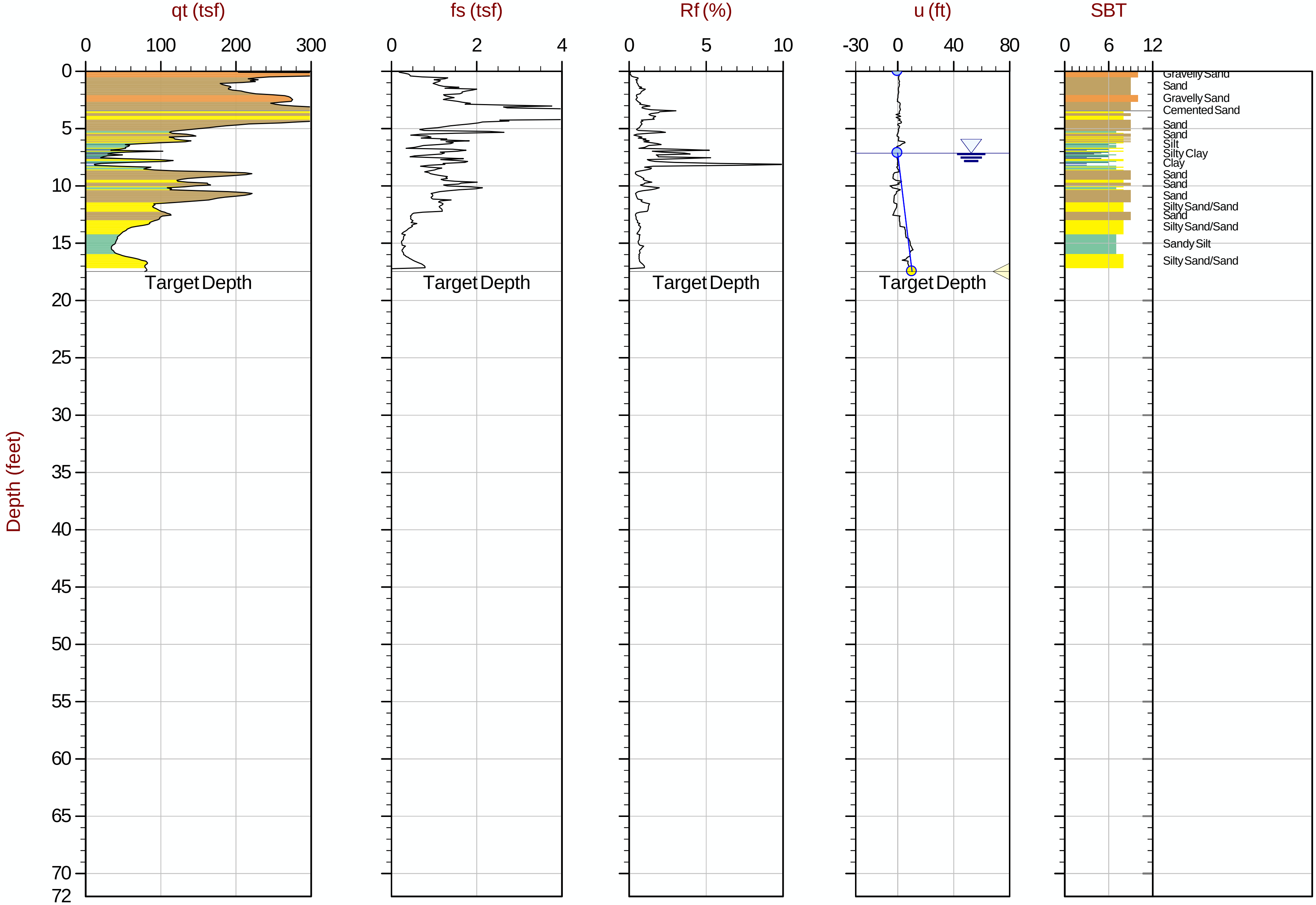
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-20 12:00
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-06
Cone: 361:T1500F15U500



Max Depth: 5.325 m / 17.47 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP06.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409721m E: 503118m

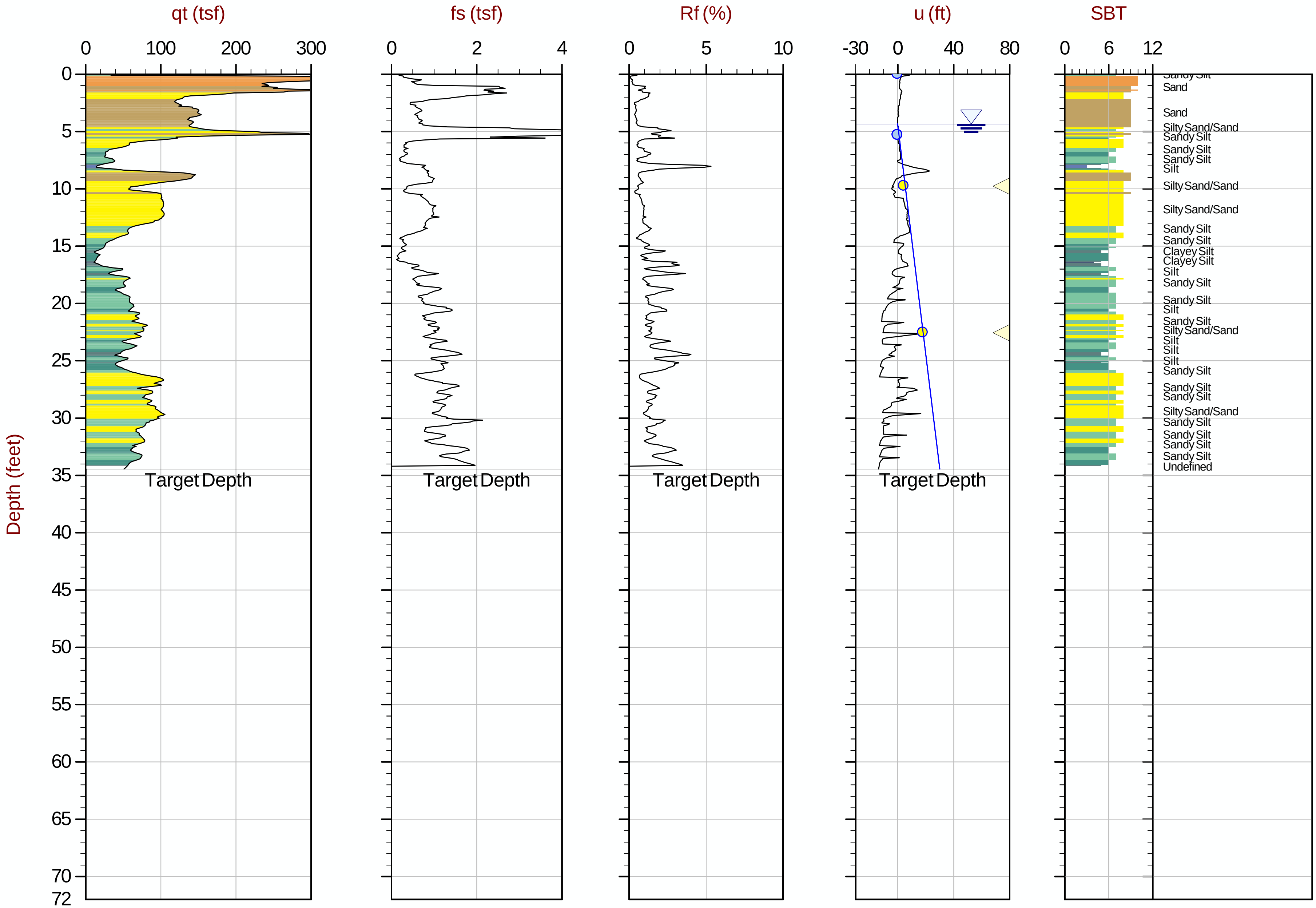
Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-20 13:23
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-07
Cone: 361:T1500F15U500



Max Depth: 10.500 m / 34.45 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP07.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409688m E: 503095m

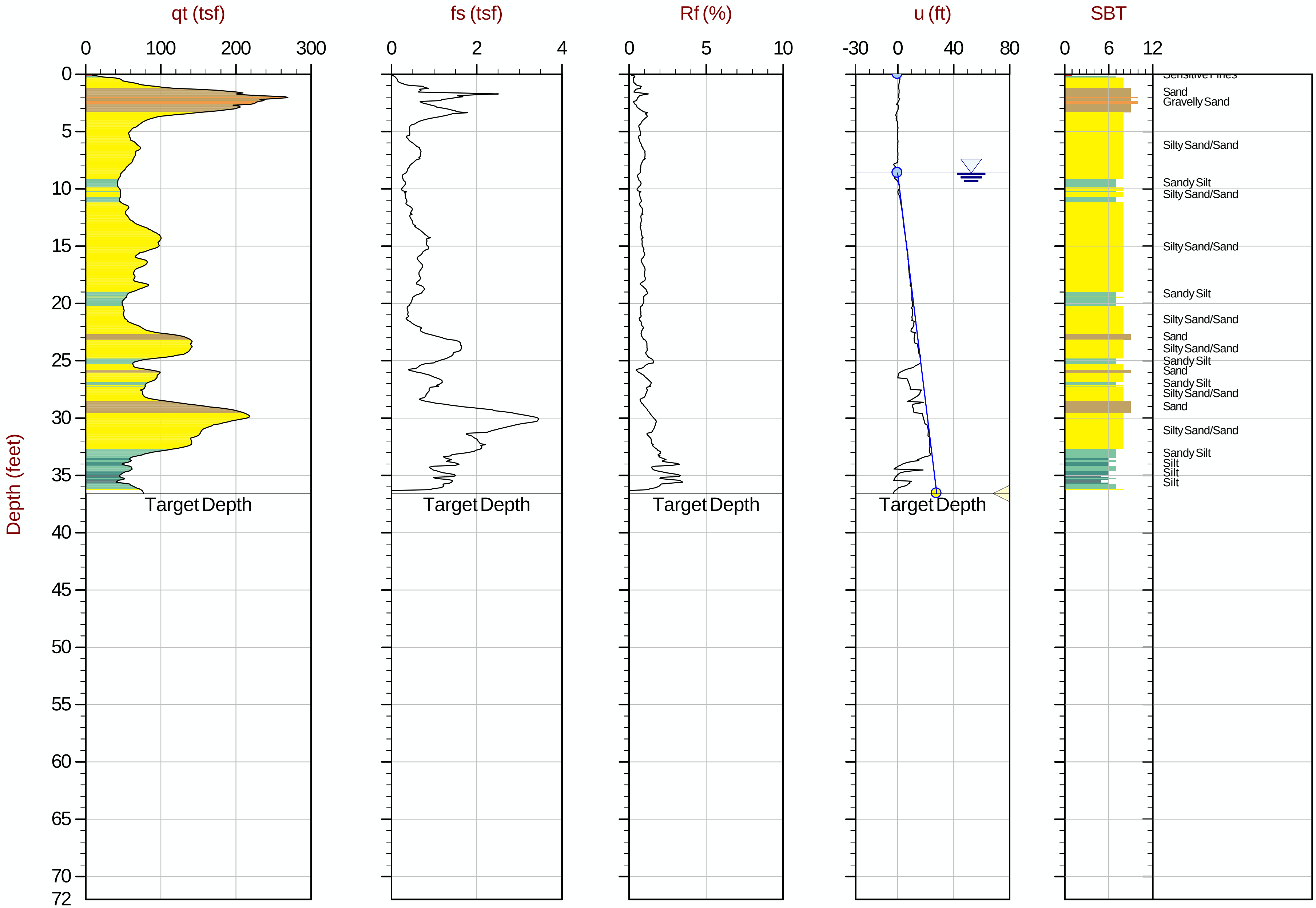
Hydrostatic Line · Ueq · Assumed Ueq · PPD, Ueq achieved · PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

EHS Support

Job No: 17-53125
Date: 2017-09-20 15:13
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-08
Cone: 361:T1500F15U500



Max Depth: 11.150 m / 36.58 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP08.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409710m E: 503219m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

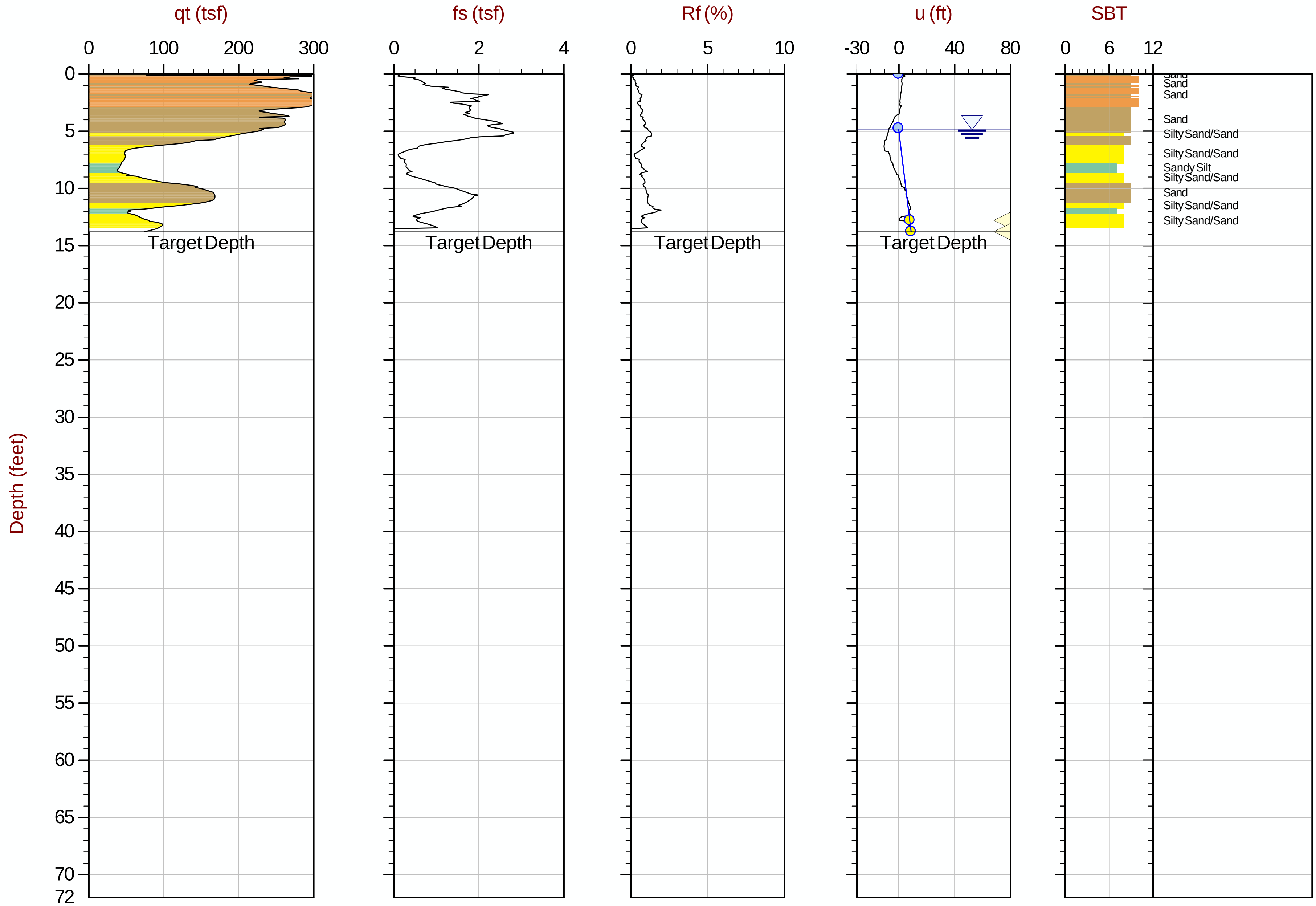
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-21 08:39
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-09
Cone: 361:T1500F15U500



Max Depth: 4.200 m / 13.78 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP09.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409634m E: 503094m

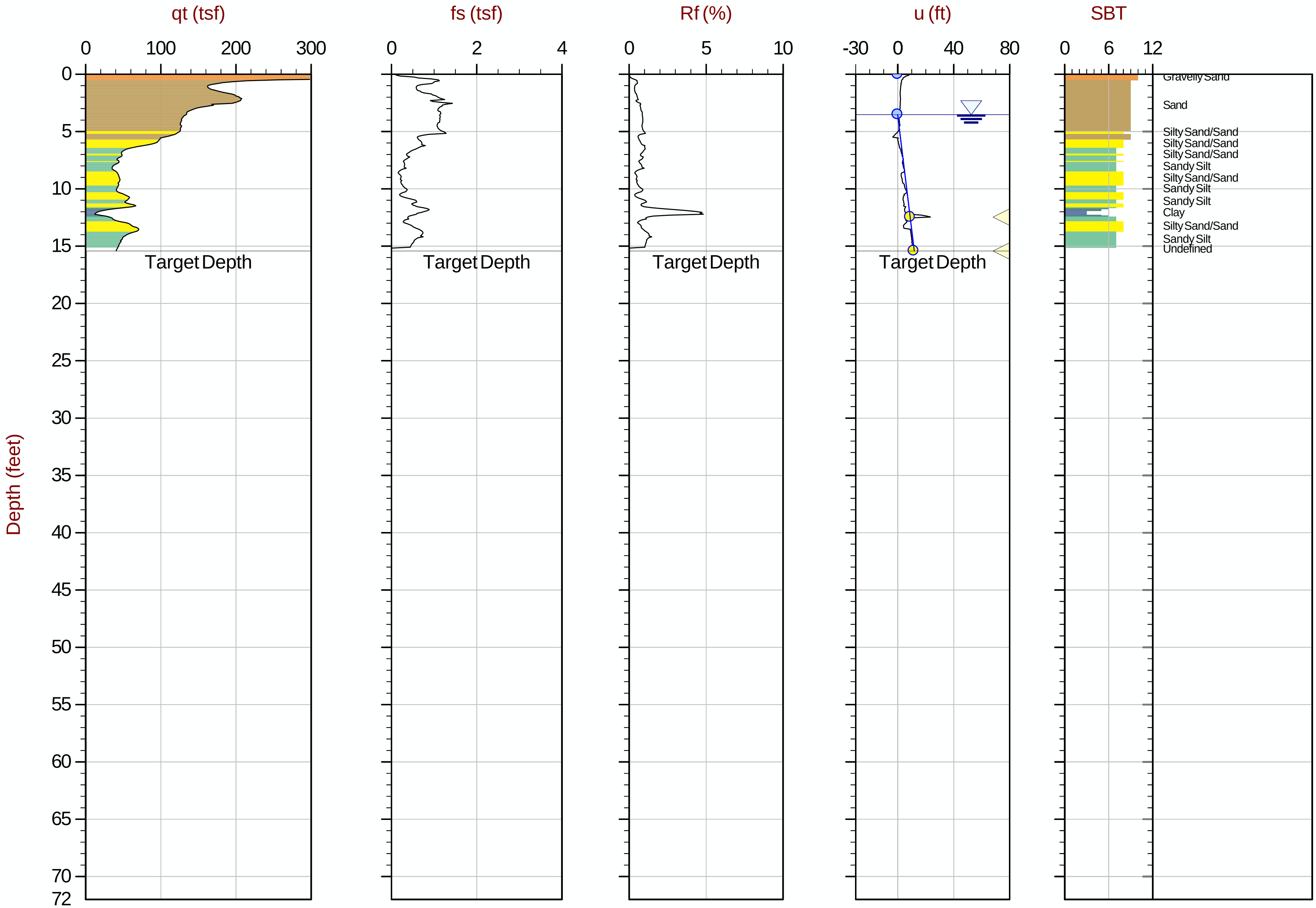
Hydrostatic Line | Ueq | Assumed Ueq | PPD, Ueq achieved | PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-21 09:43
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-10
Cone: 361:T1500F15U500



Max Depth: 4.700 m / 15.42 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP10.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409645m E: 503115m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

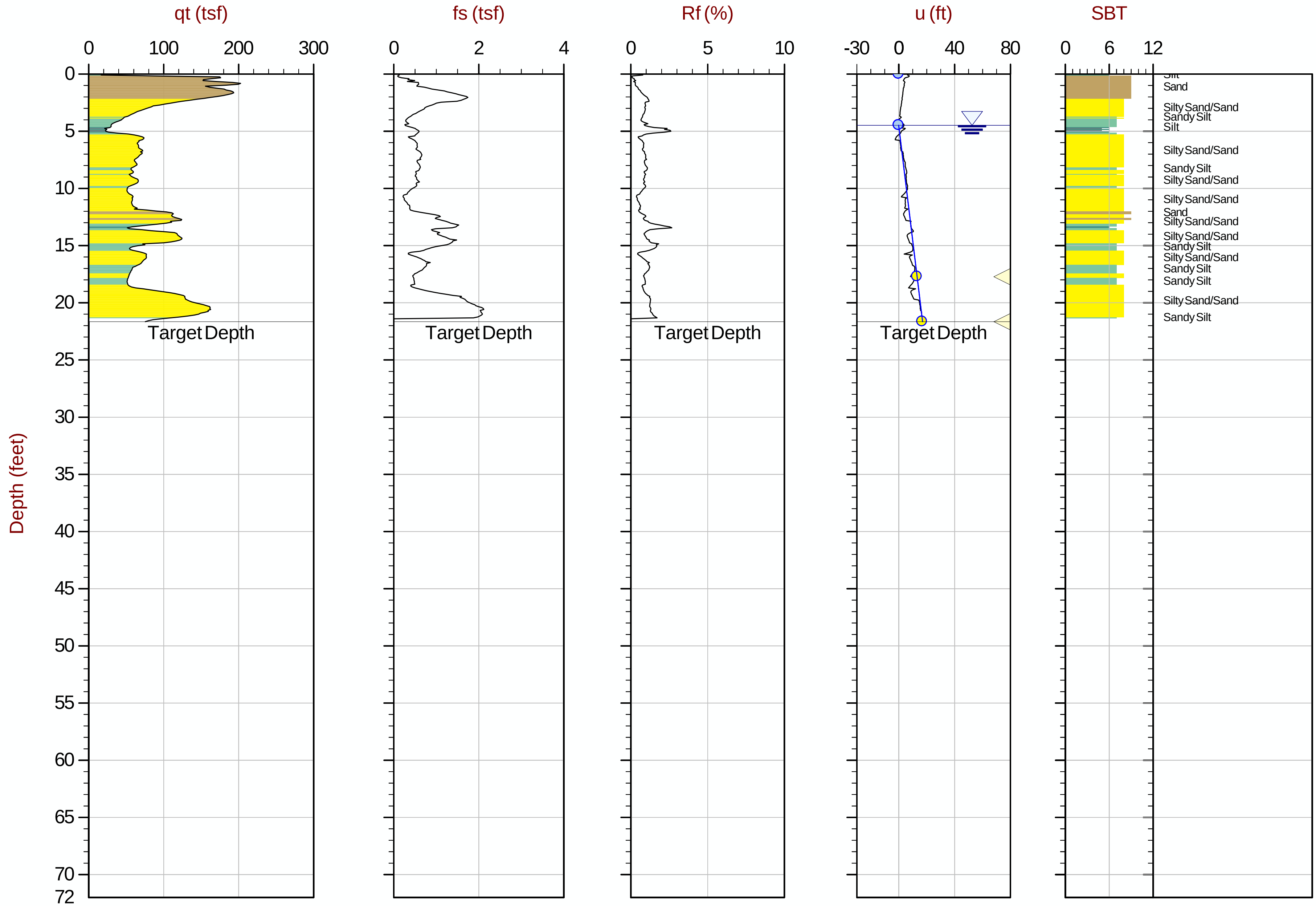
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-21 10:52
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-11
Cone: 361:T1500F15U500



Max Depth: 6.600 m / 21.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP11.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409647m E: 503142m

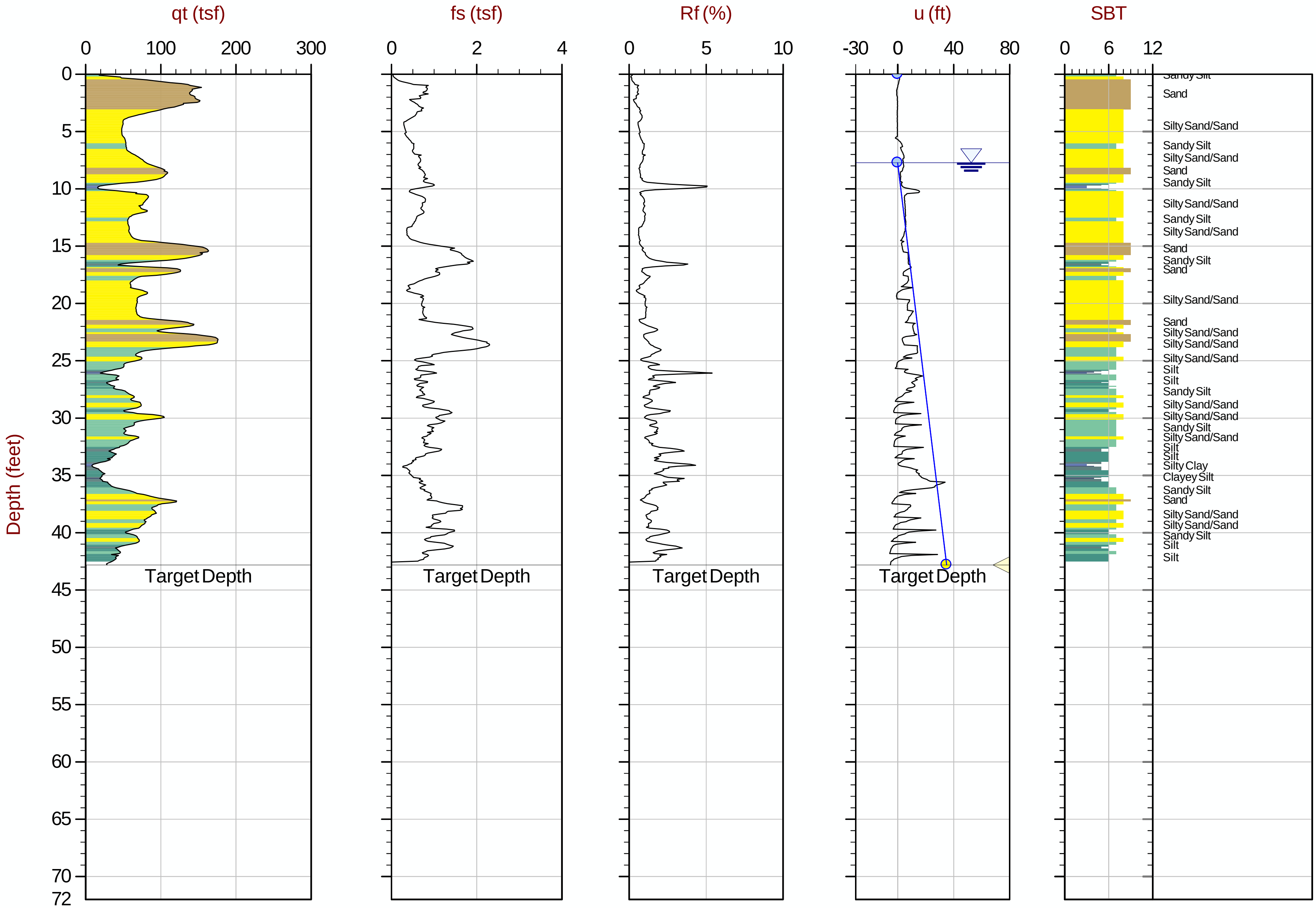
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-21 12:59
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-12
Cone: 361:T1500F15U500



Max Depth: 13.050 m / 42.81 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP12.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409484m E: 503061m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

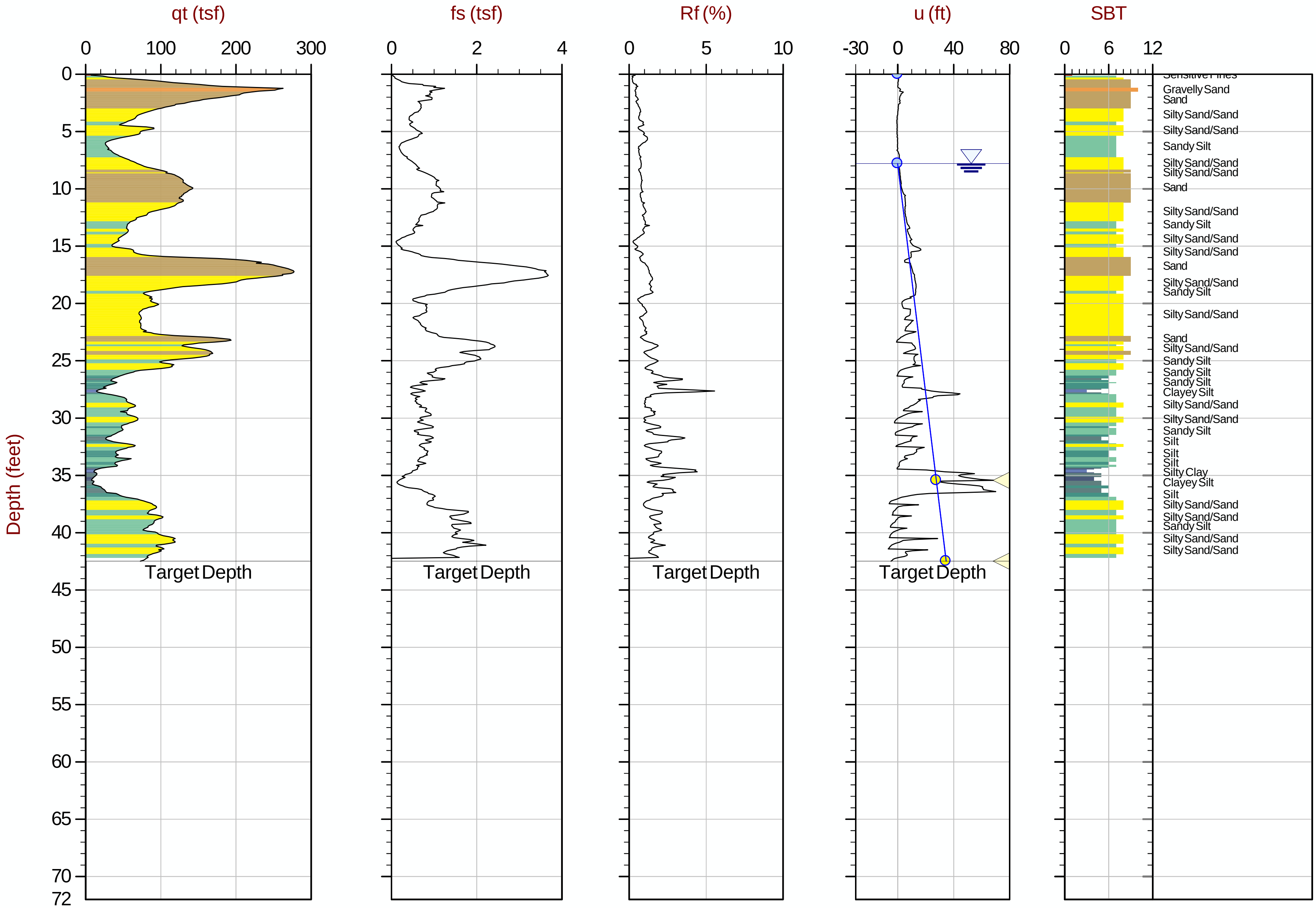
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-21 14:44
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-13
Cone: 361:T1500F15U500



Max Depth: 12.950 m / 42.49 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP13.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409502m E: 503049m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

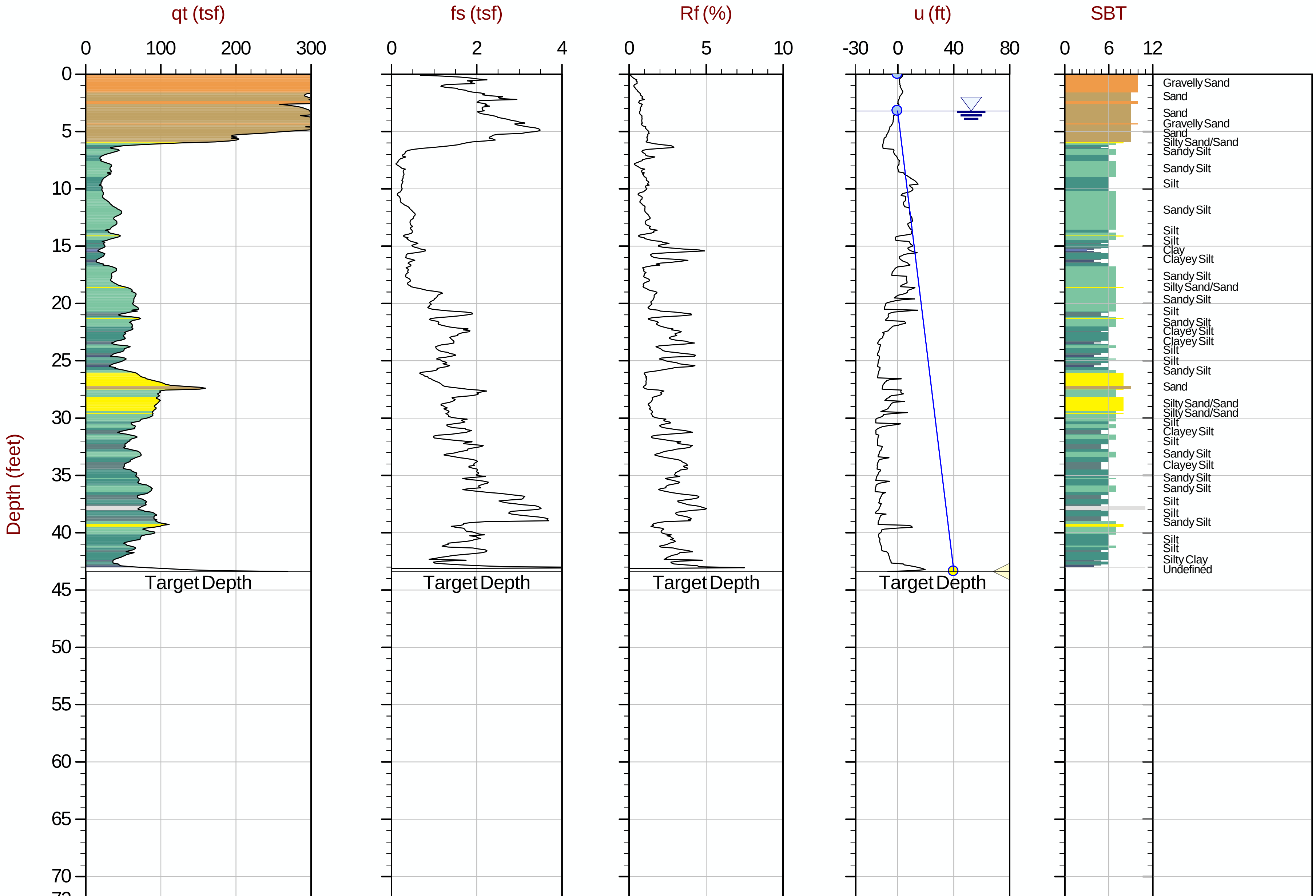
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-22 08:30
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-14
Cone: 361:T1500F15U500



Max Depth: 13.225 m / 43.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP14.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409580m E: 503075m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

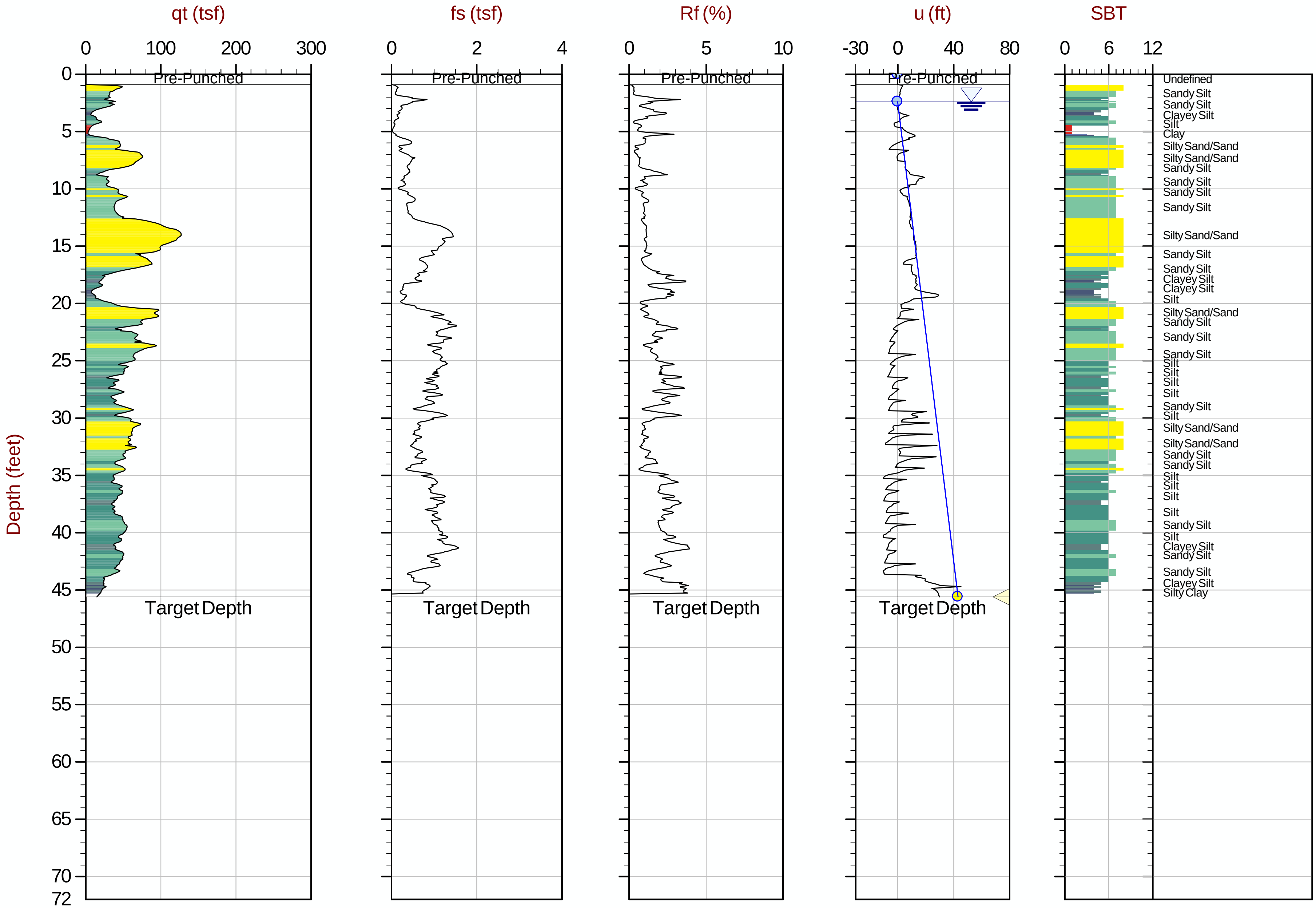
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-22 10:28
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-15
Cone: 361:T1500F15U500



Max Depth: 13.900 m / 45.60 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP15.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409575m E: 503055m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

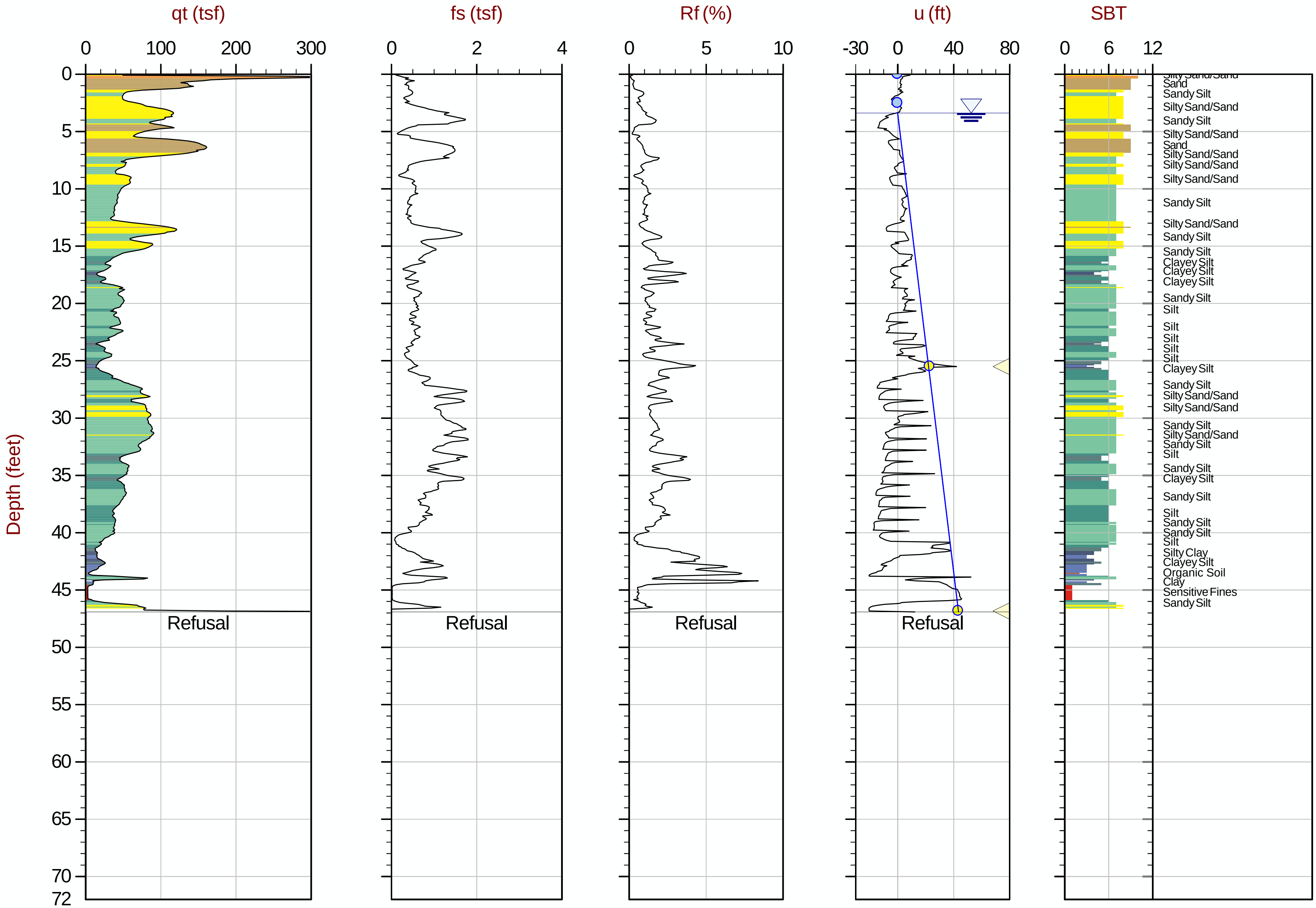
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-22 12:57
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-16
Cone: 361:T1500F15U500



Max Depth: 14.300 m / 46.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP16.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409575m E: 503091m

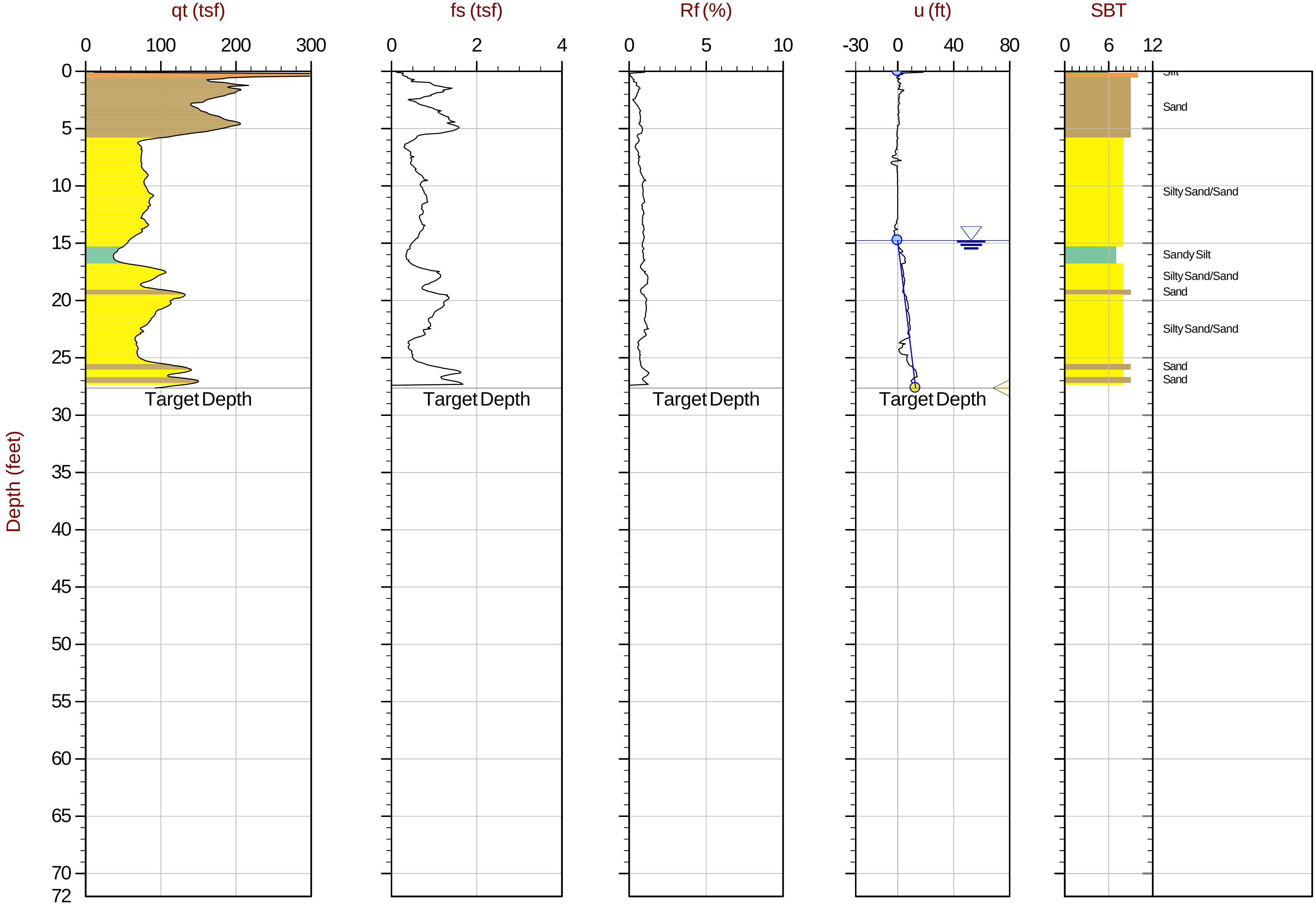
Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

EHS Support

Job No: 17-53125
Date: 2017-09-22 14:48
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-17
Cone: 361:T1500F15U500



Max Depth: 8.425 m / 27.64 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP17.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409575m E: 503179m

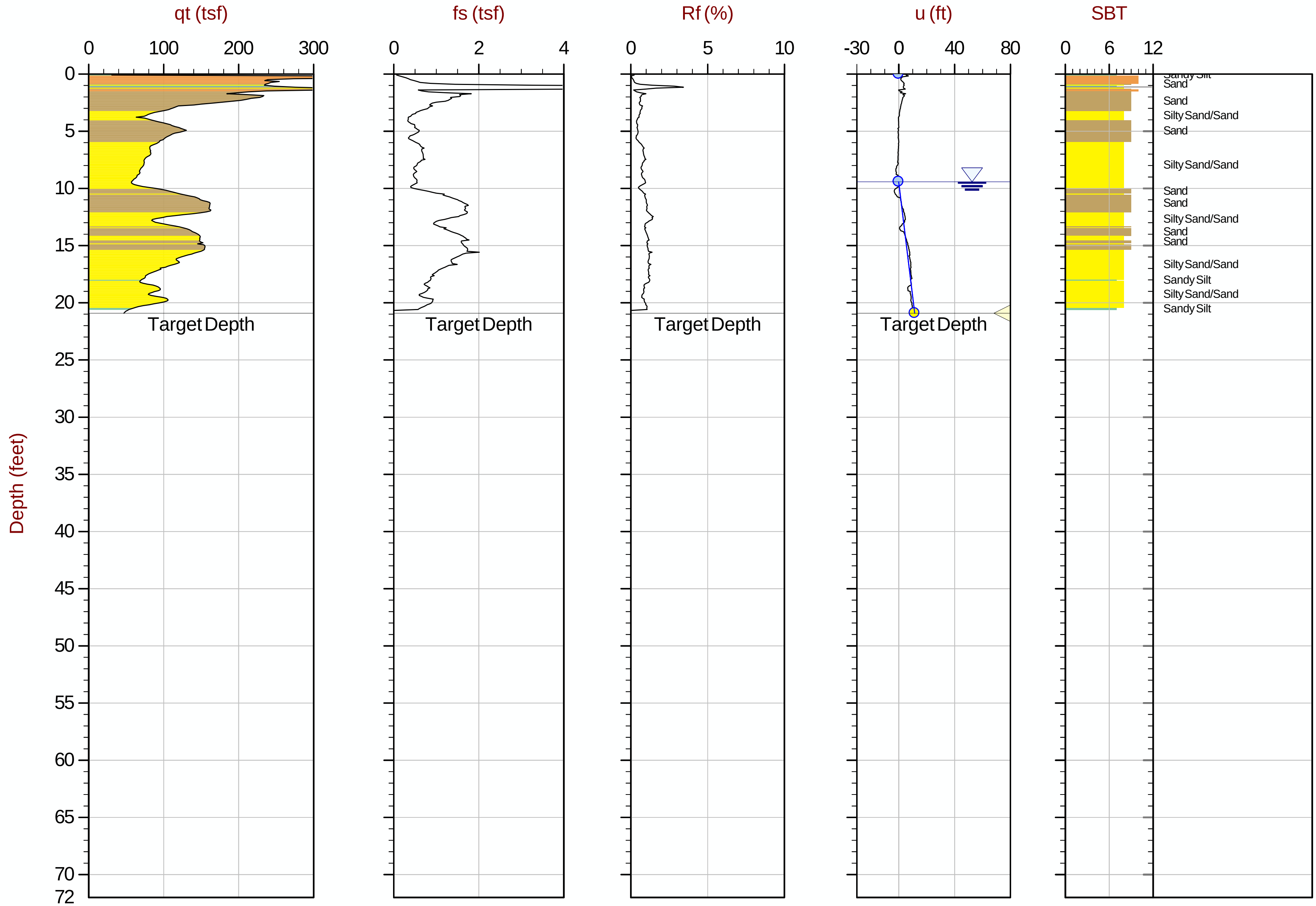
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-25 08:28
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-18
Cone: 361:T1500F15U500



Max Depth: 6.375 m / 20.92 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP18.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409669m E: 503215m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

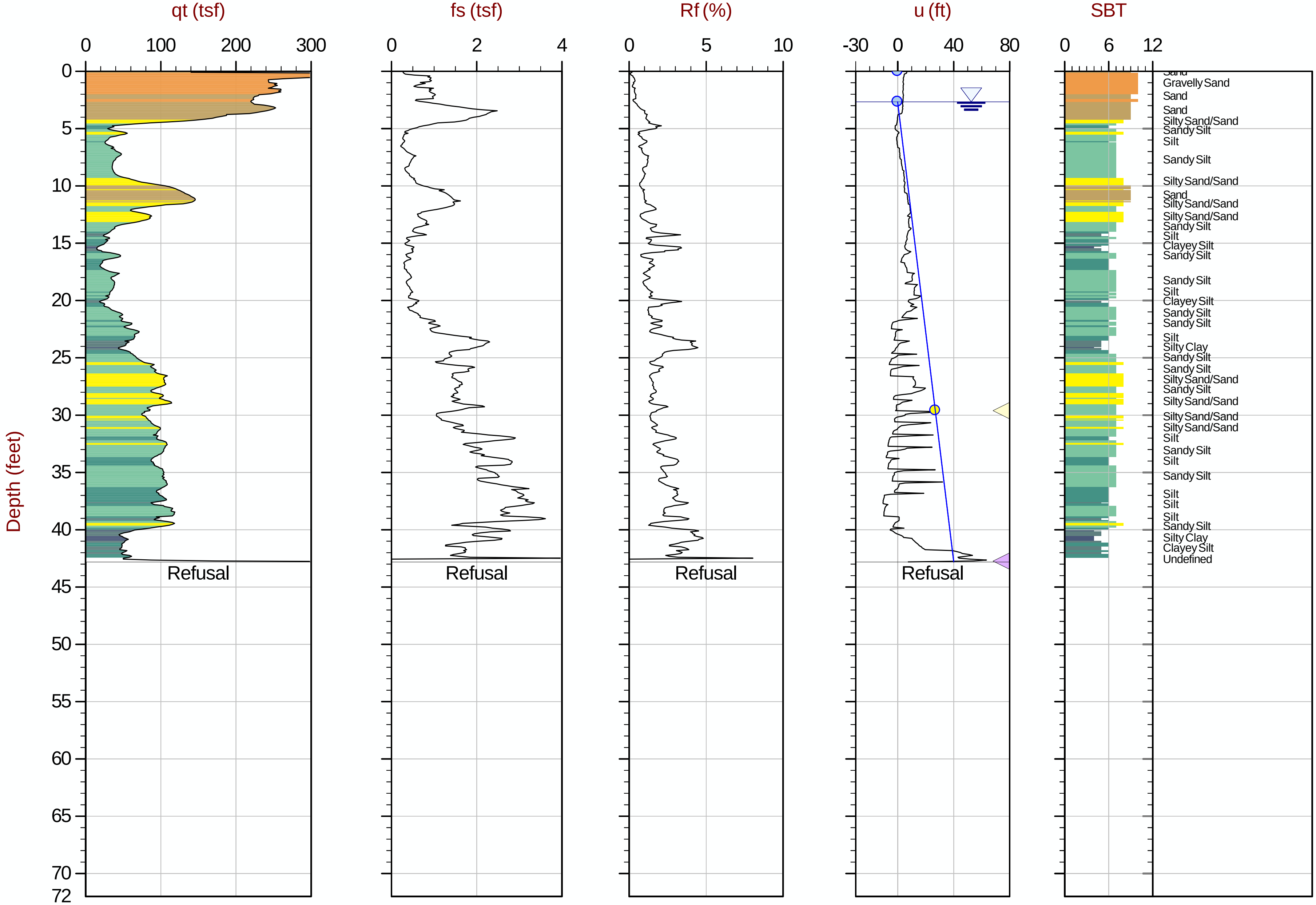
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-25 09:42
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-19
Cone: 361:T1500F15U500



Max Depth: 13.050 m / 42.81 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP19.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409554m E: 503095m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

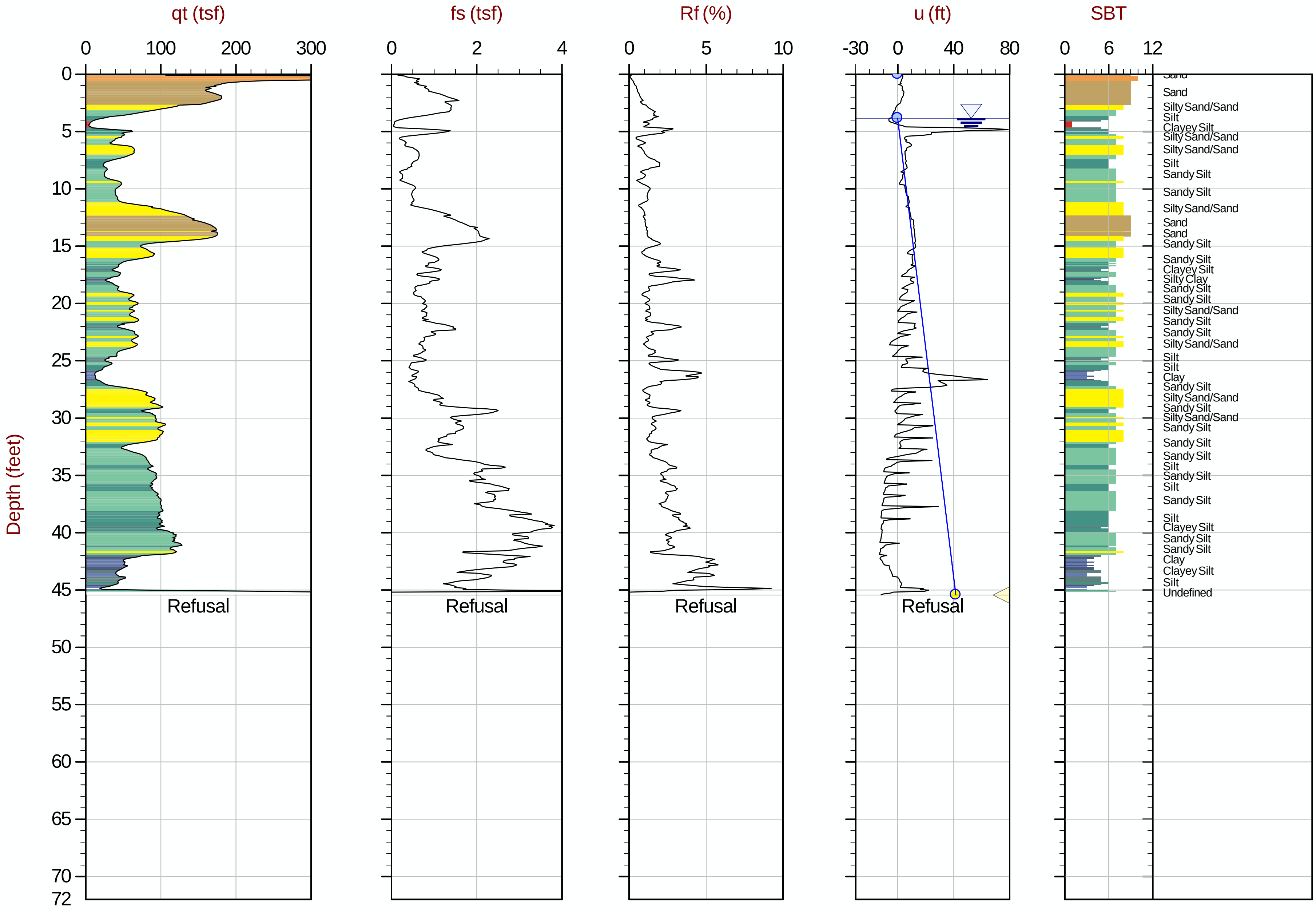
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-25 12:29
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-20
Cone: 361:T1500F15U500



Max Depth: 13.850 m / 45.44 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP20.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409564m E: 503102m

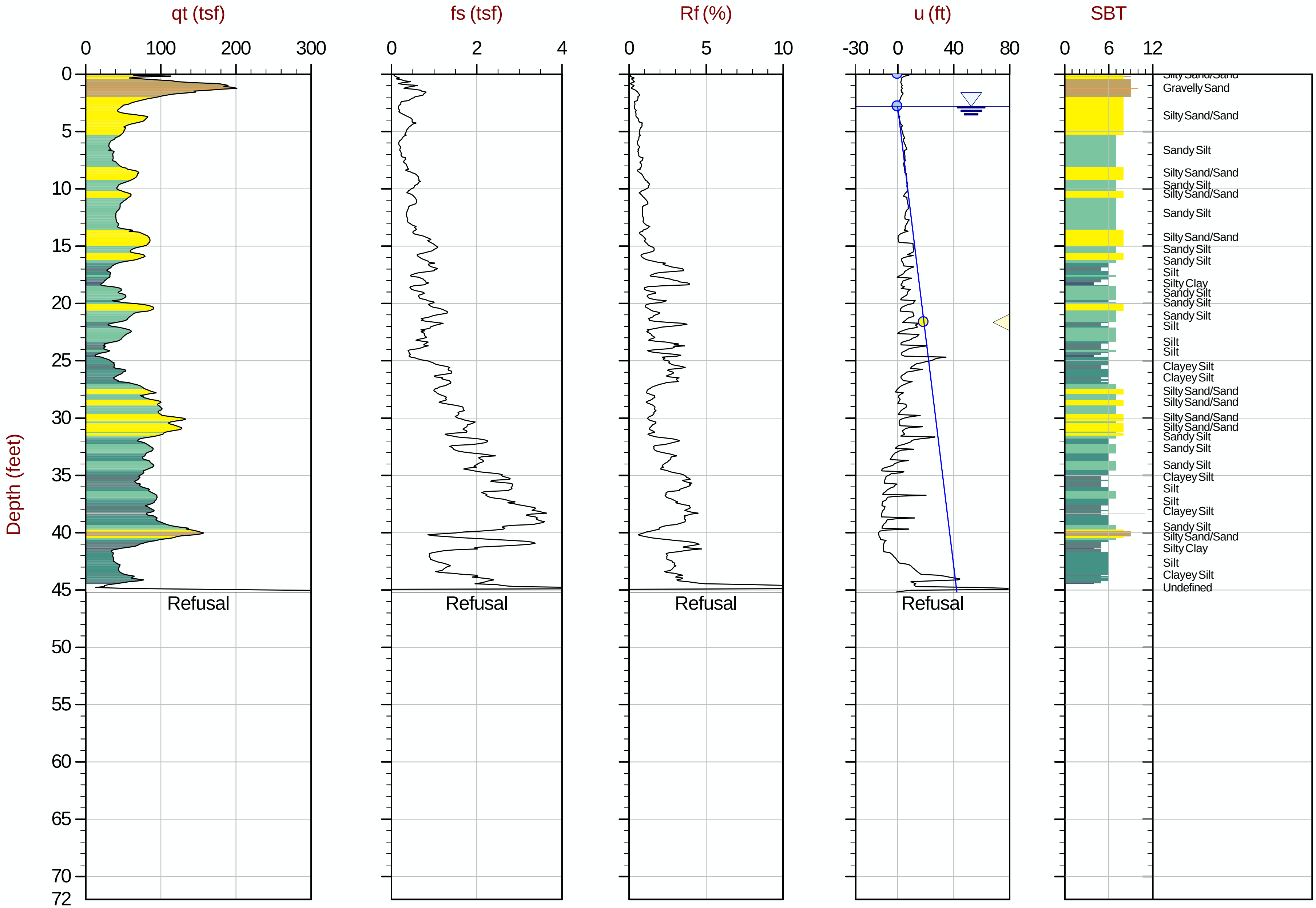
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-25 14:29
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-21
Cone: 361:T1500F15U500



Max Depth: 13.775 m / 45.19 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP21.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409523m E: 503106m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

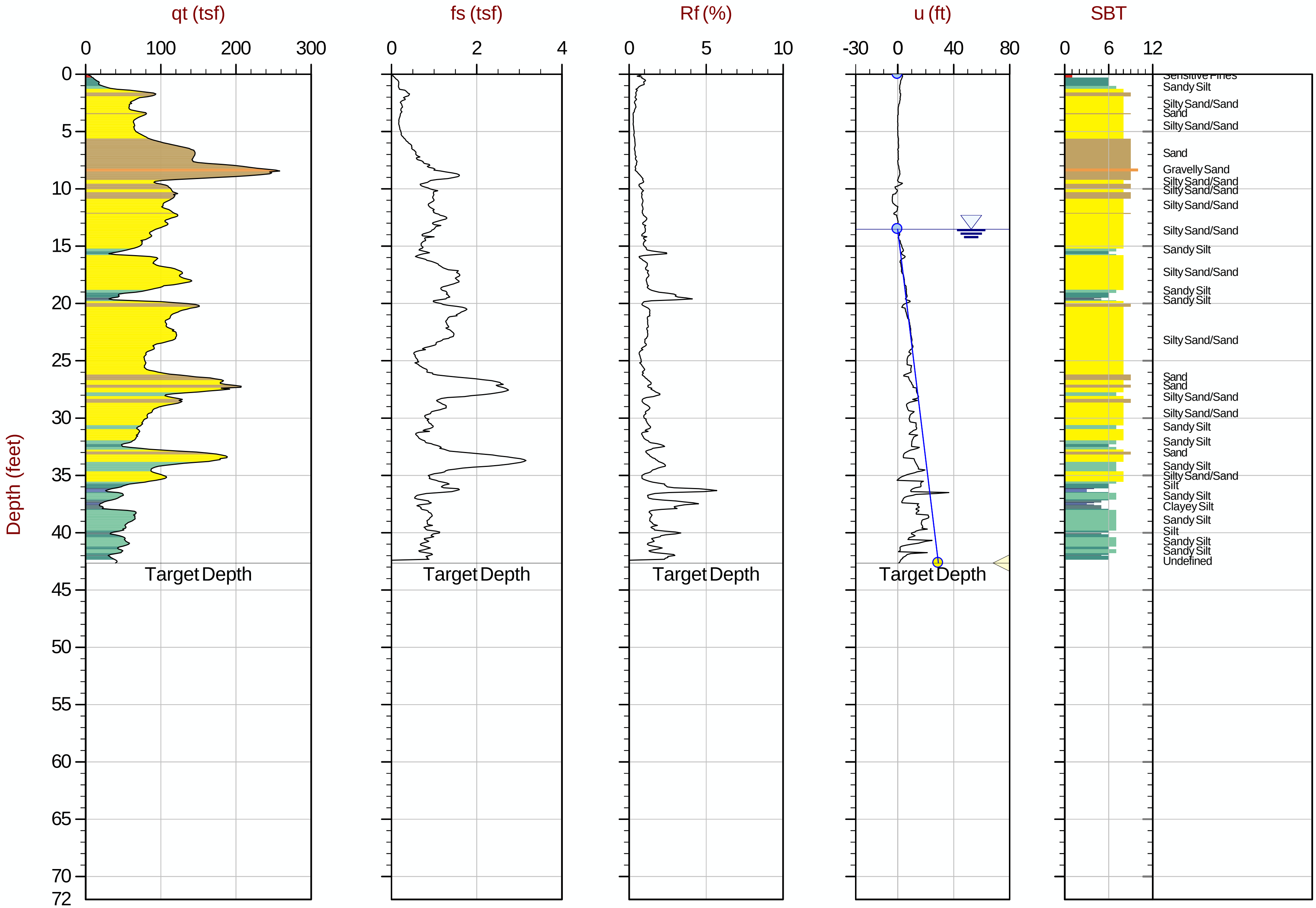
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-26 08:51
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-22
Cone: 361:T1500F15U500



Max Depth: 13.000 m / 42.65 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP22.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409549m E: 503152m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

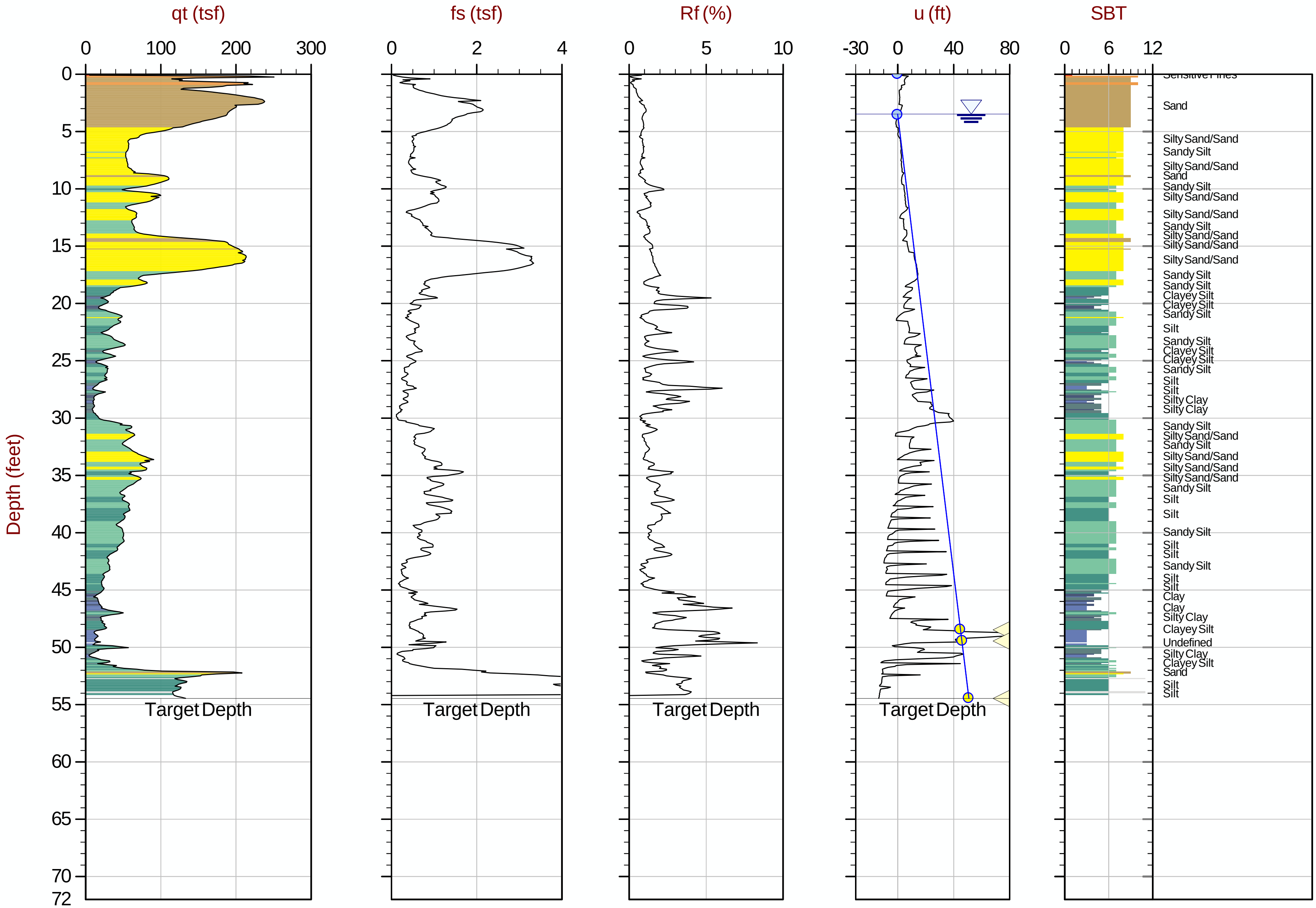
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-26 10:46
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-23
Cone: 361:T1500F15U500



Max Depth: 16.600 m / 54.46 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP23.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409547m E: 503112m

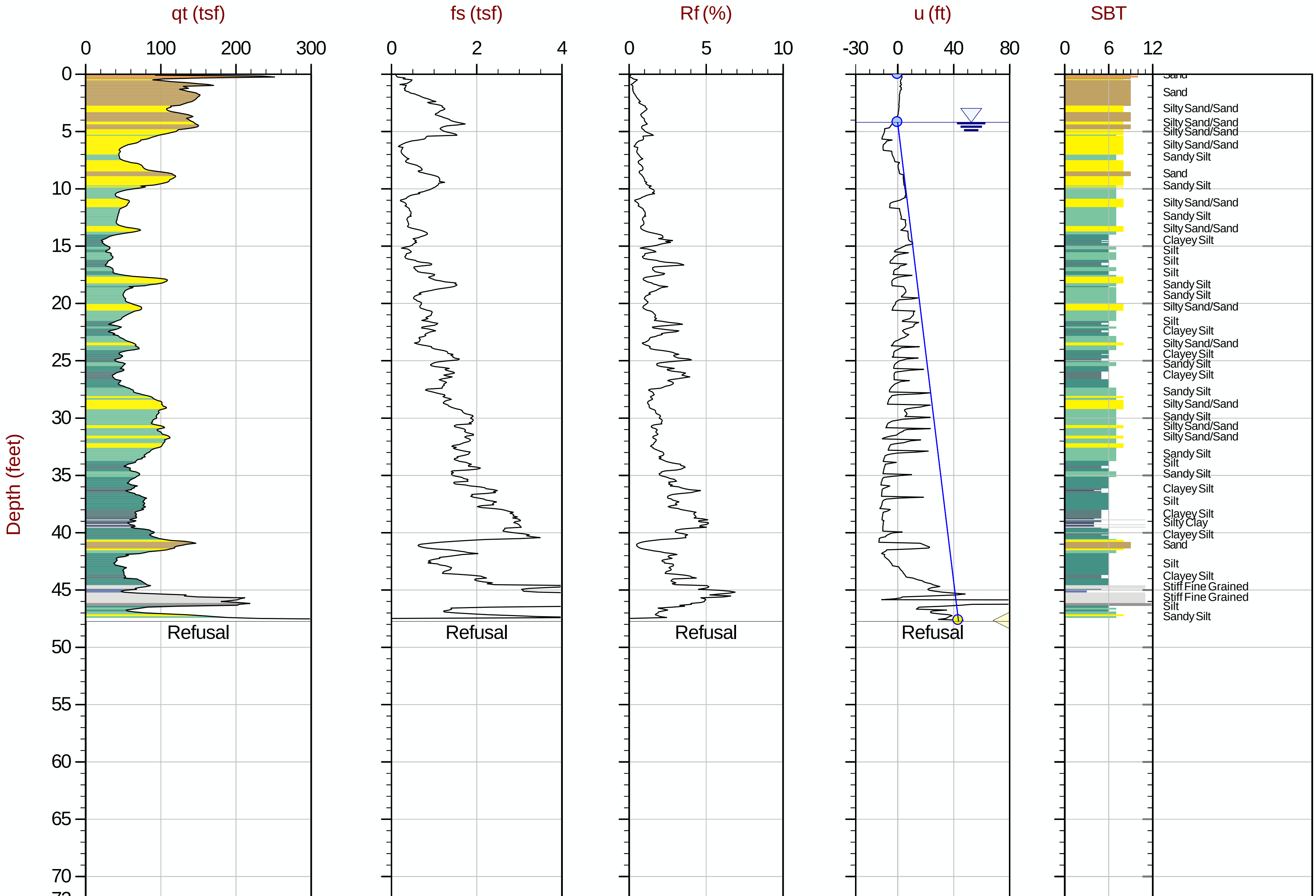
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-26 13:15
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-24
Cone: 361:T1500F15U500



Max Depth: 14.550 m / 47.74 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP24.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409516m E: 503086m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

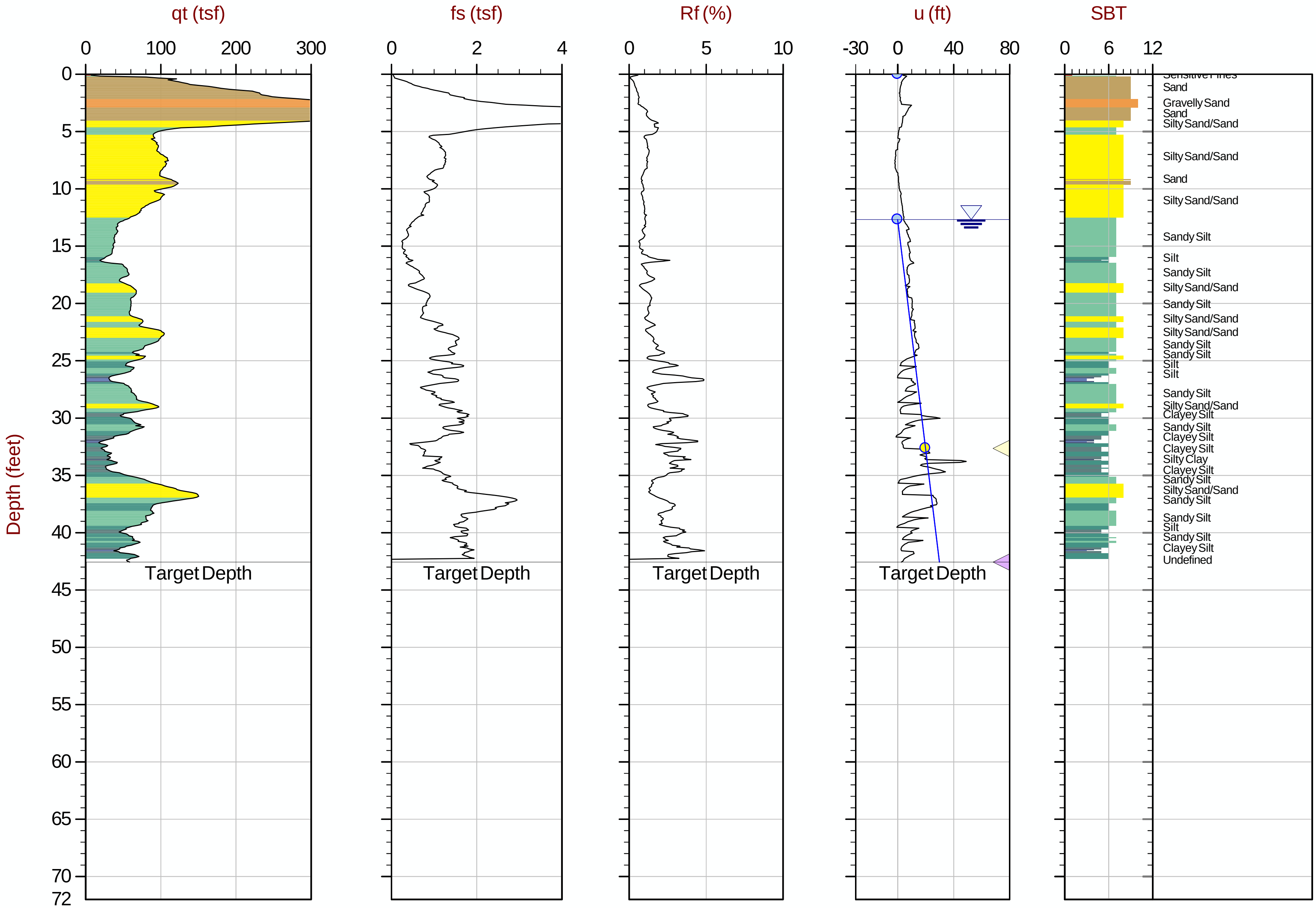
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-26 15:21
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-25
Cone: 361:T1500F15U500



Max Depth: 12.975 m / 42.57 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP25.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409484m E: 503085m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

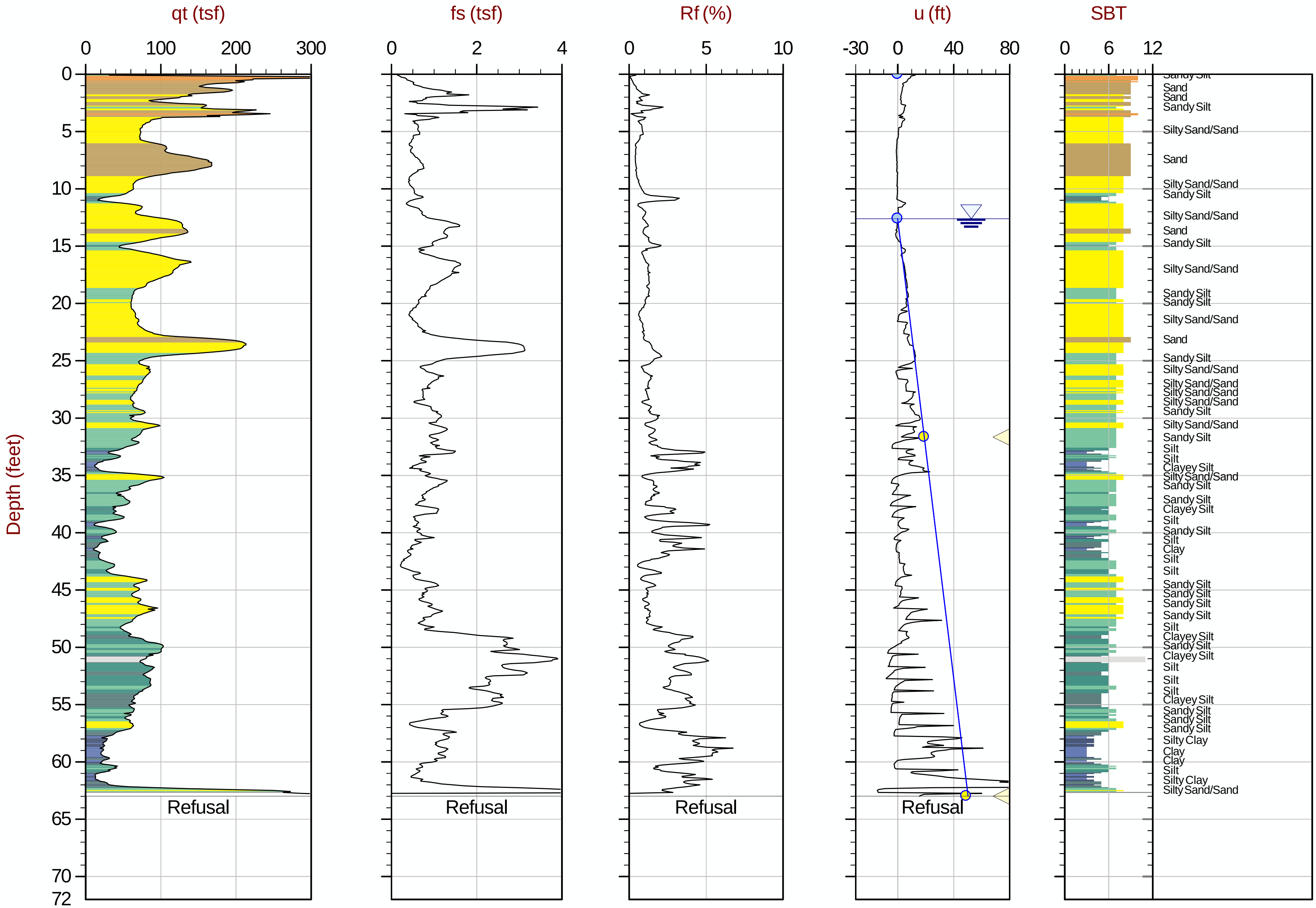
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-27 08:40
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-26
Cone: 361:T1500F15U500



Max Depth: 19.200 m / 62.99 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP26.COR

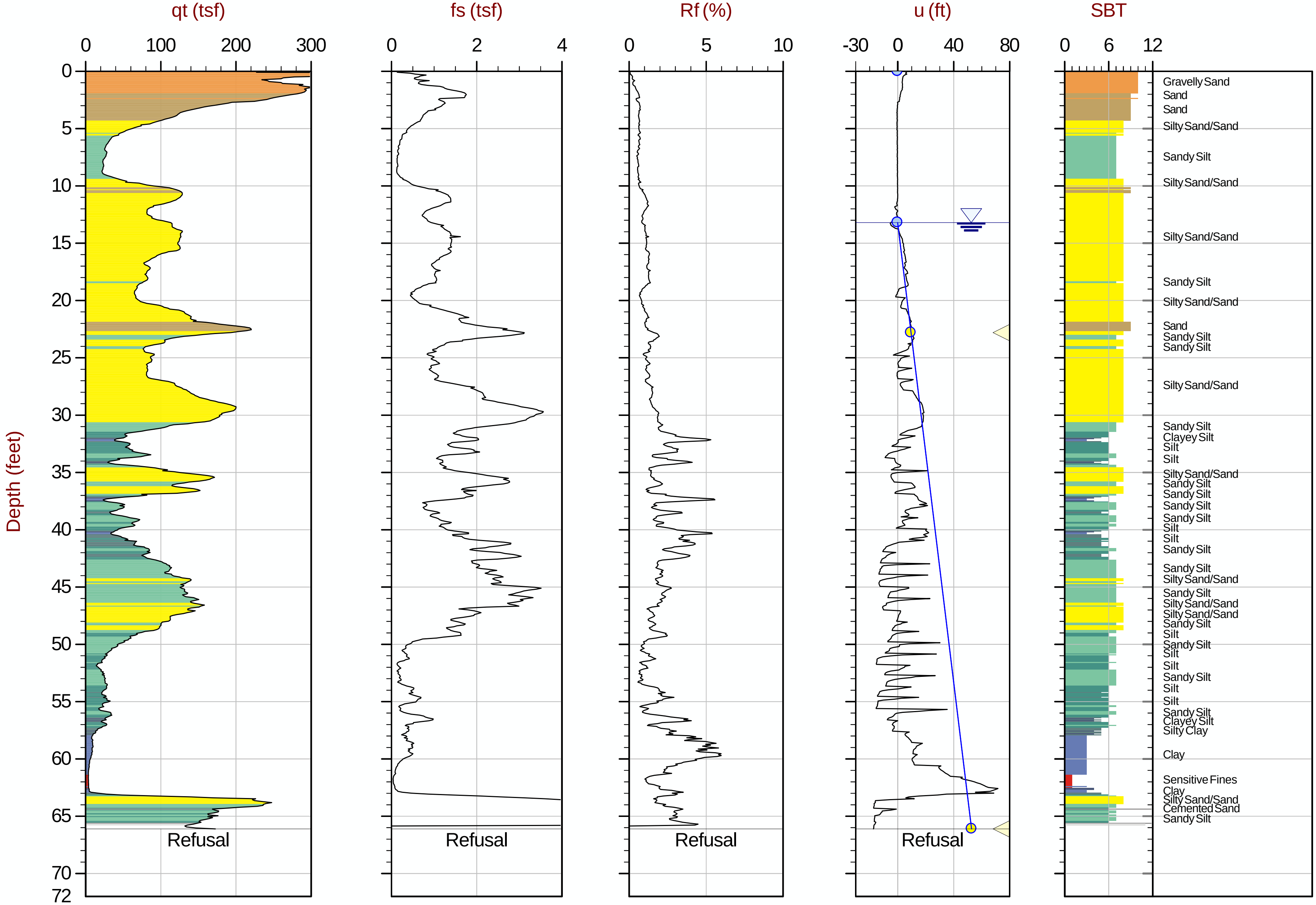
SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409617m E: 503192m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

EHS Support

Job No: 17-53125
Date: 2017-09-27 10:50
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-27
Cone: 361:T1500F15U500



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP27.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409641m E: 503225m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

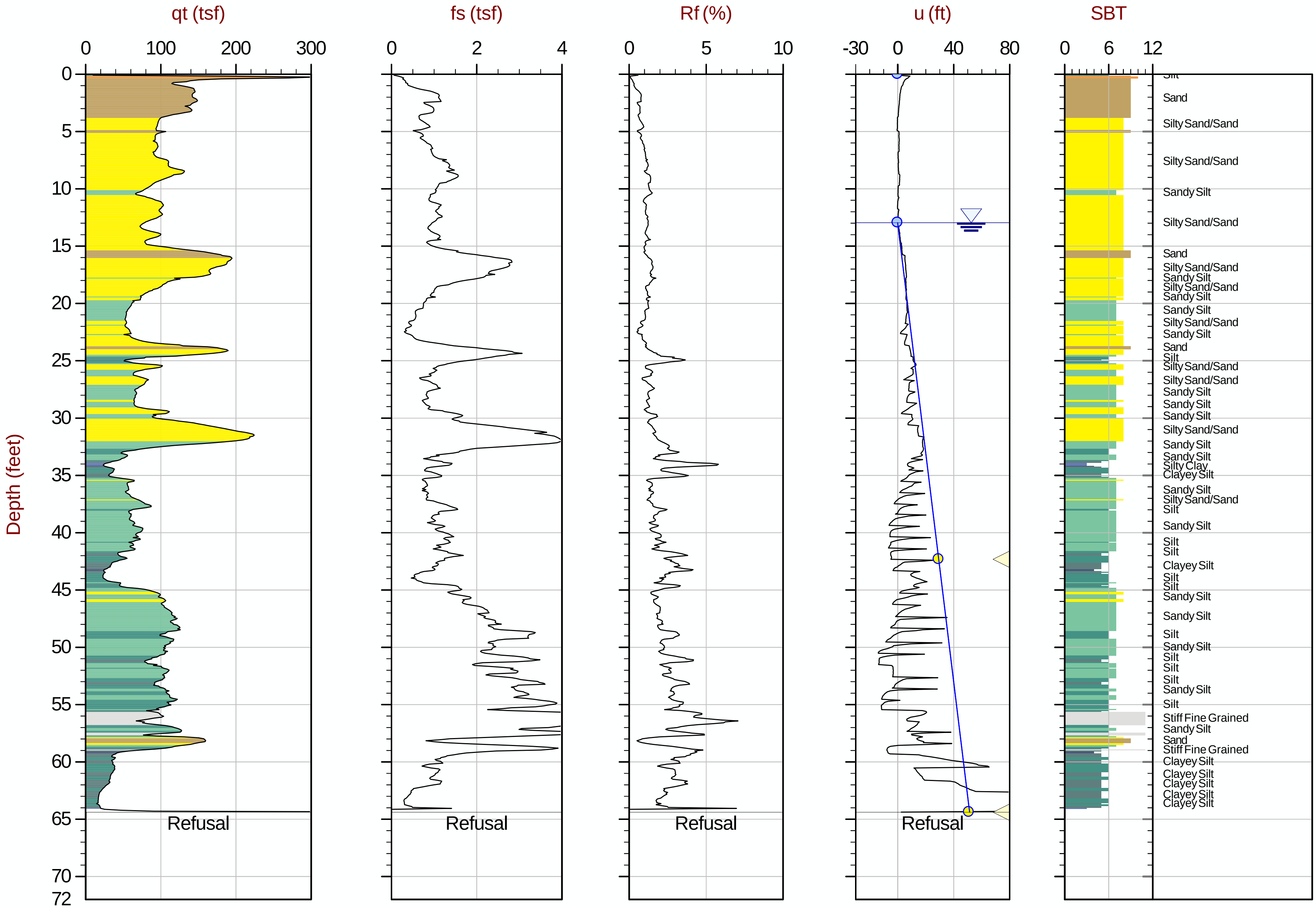
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

ConeTec

EHS Support

Job No: 17-53125
Date: 2017-09-27 13:27
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-28
Cone: 361:T1500F15U500



Max Depth: 19.625 m / 64.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP28.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409626m E: 503205m

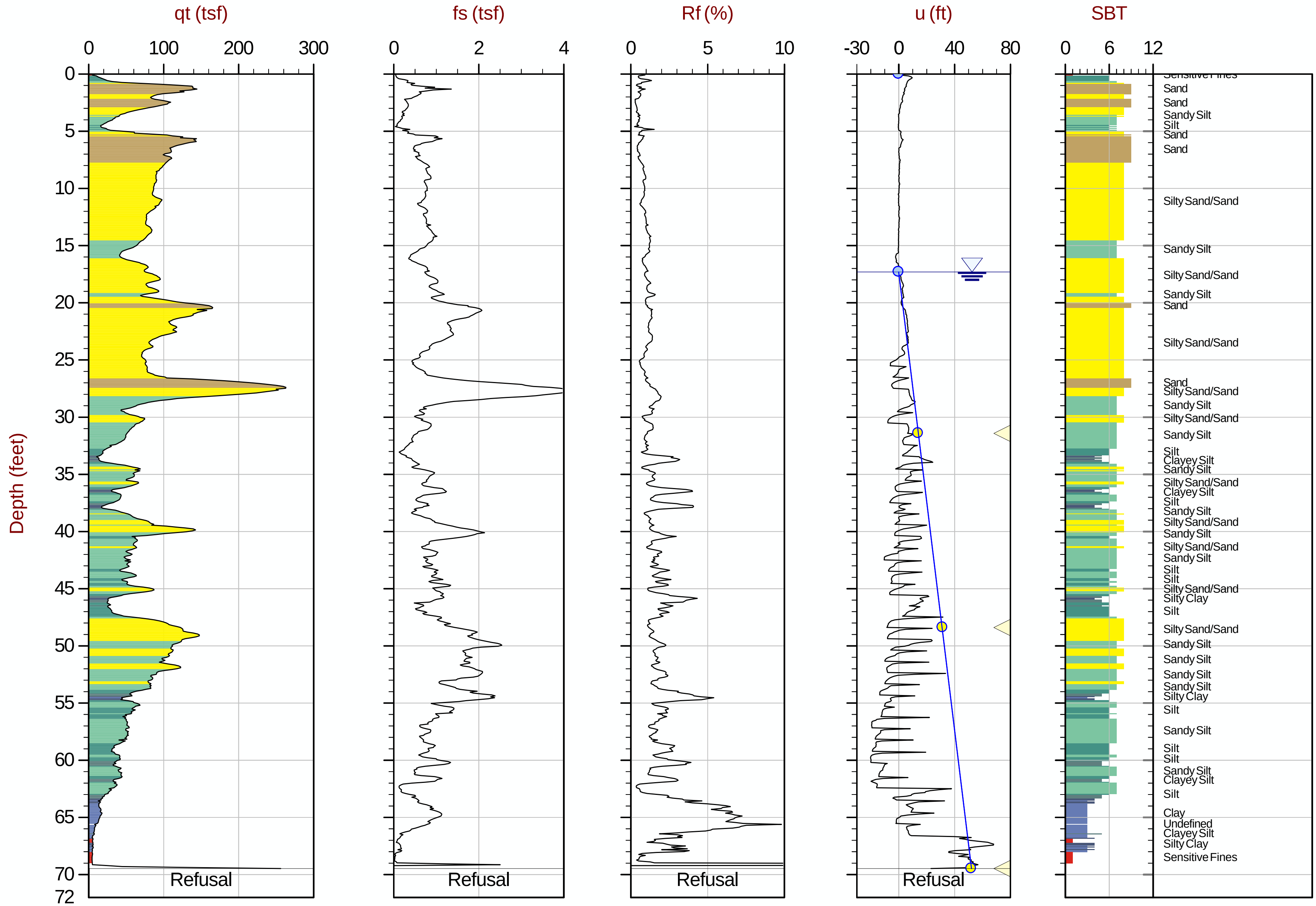
Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-28 08:42
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-29
Cone: 361:T1500F15U500



Max Depth: 21.175 m / 69.47 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP29.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409612m E: 503226m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

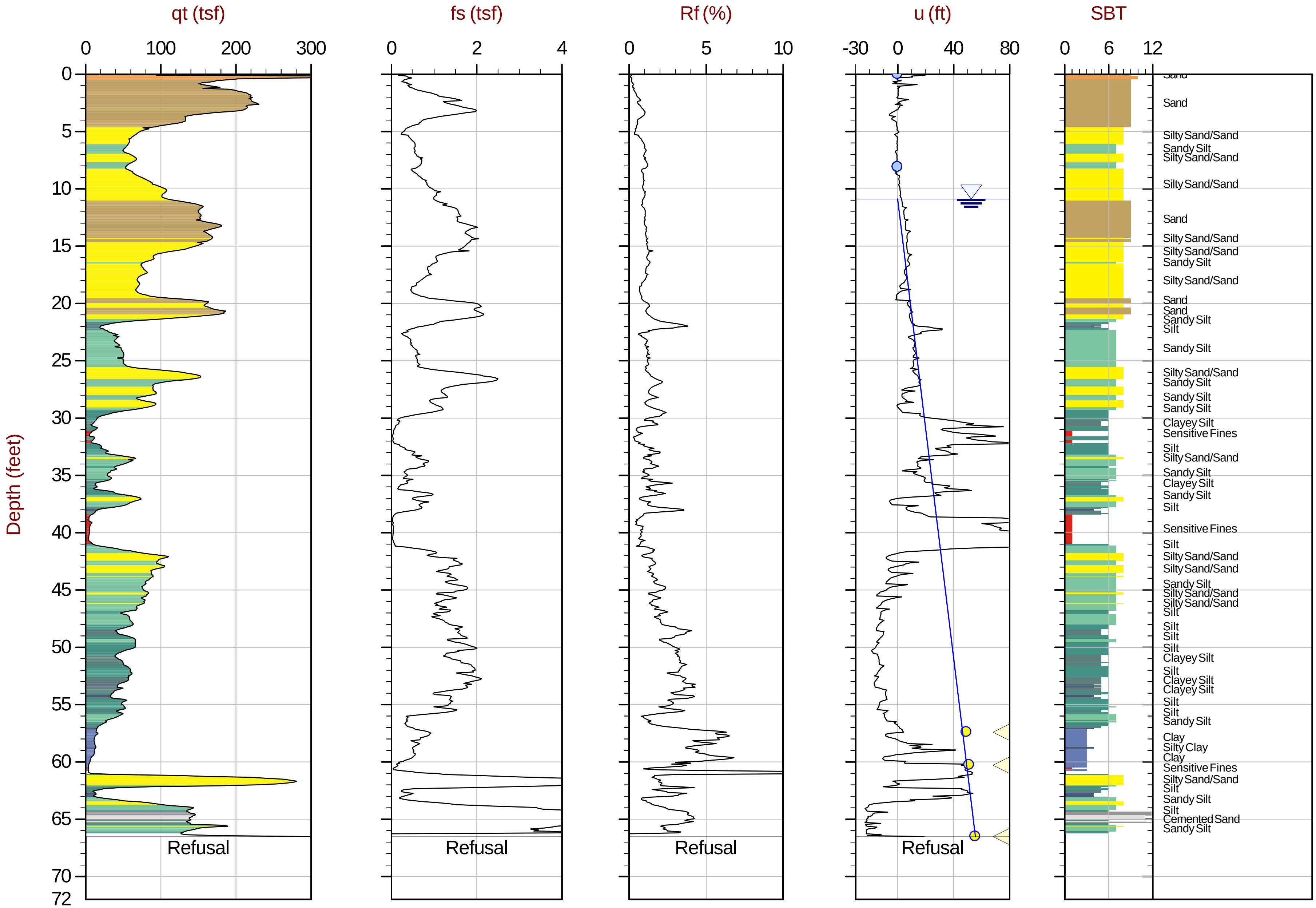
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-28 11:15
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-30
Cone: 361:T1500F15U500



Max Depth: 20.275 m / 66.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP30.COR

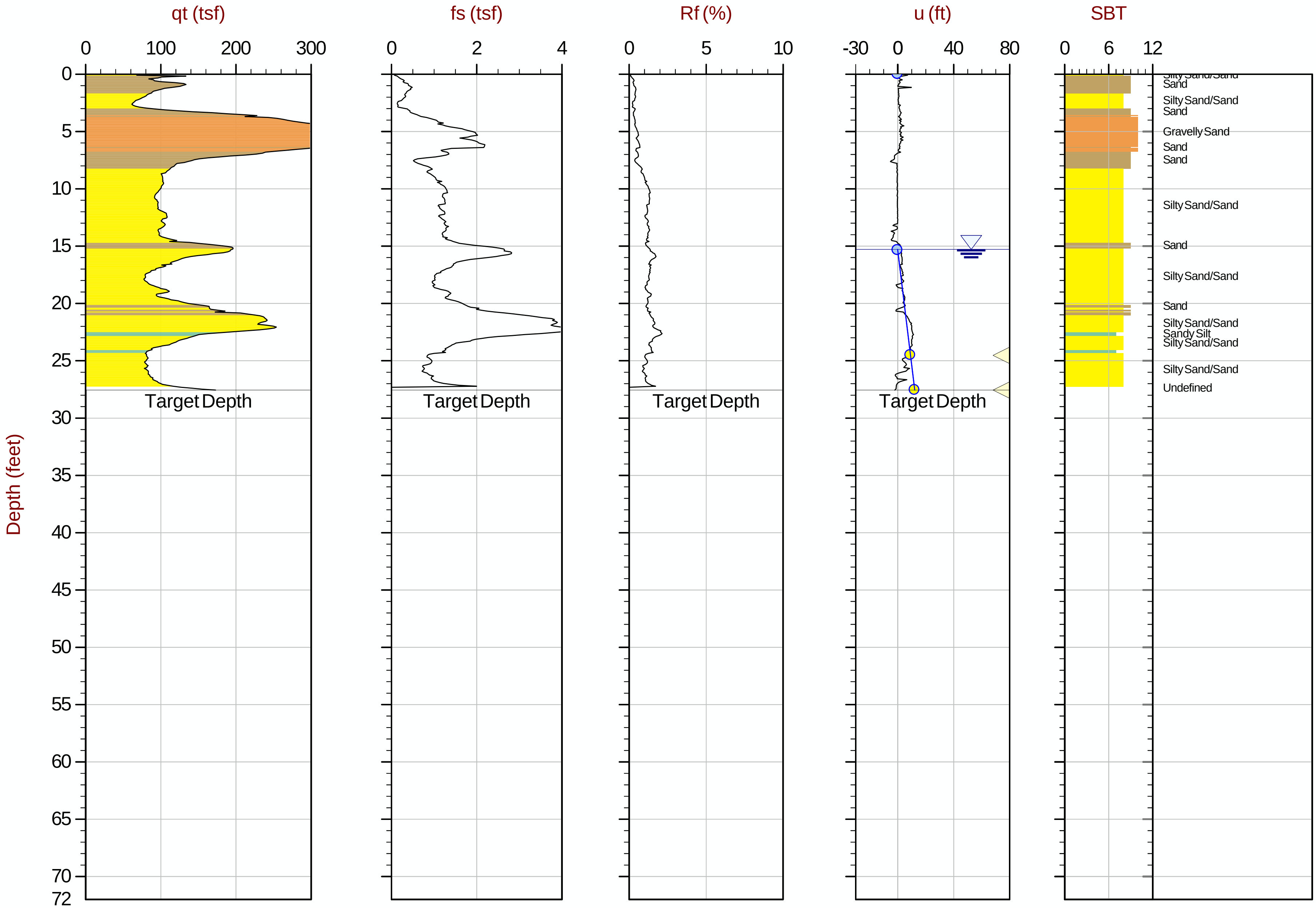
SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409643m E: 503176m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

EHS Support

Job No: 17-53125
Date: 2017-09-29 14:09
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-32
Cone: 361:T1500F15U500



Max Depth: 8.400 m / 27.56 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP32.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409562m E: 503206m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

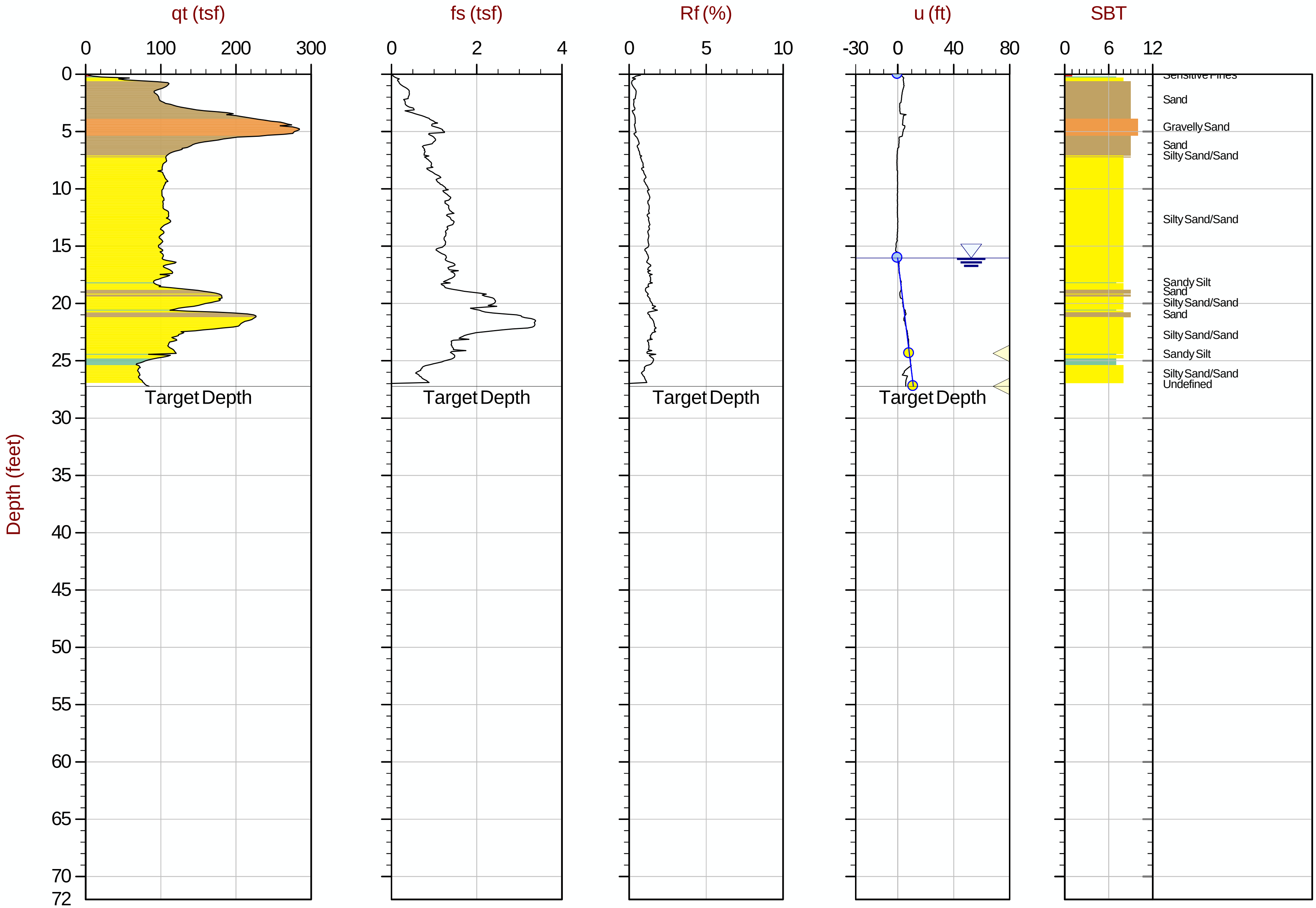
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-29 08:24
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-33
Cone: 361:T1500F15U500



Max Depth: 8.300 m / 27.23 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP33.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409532m E: 503186m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

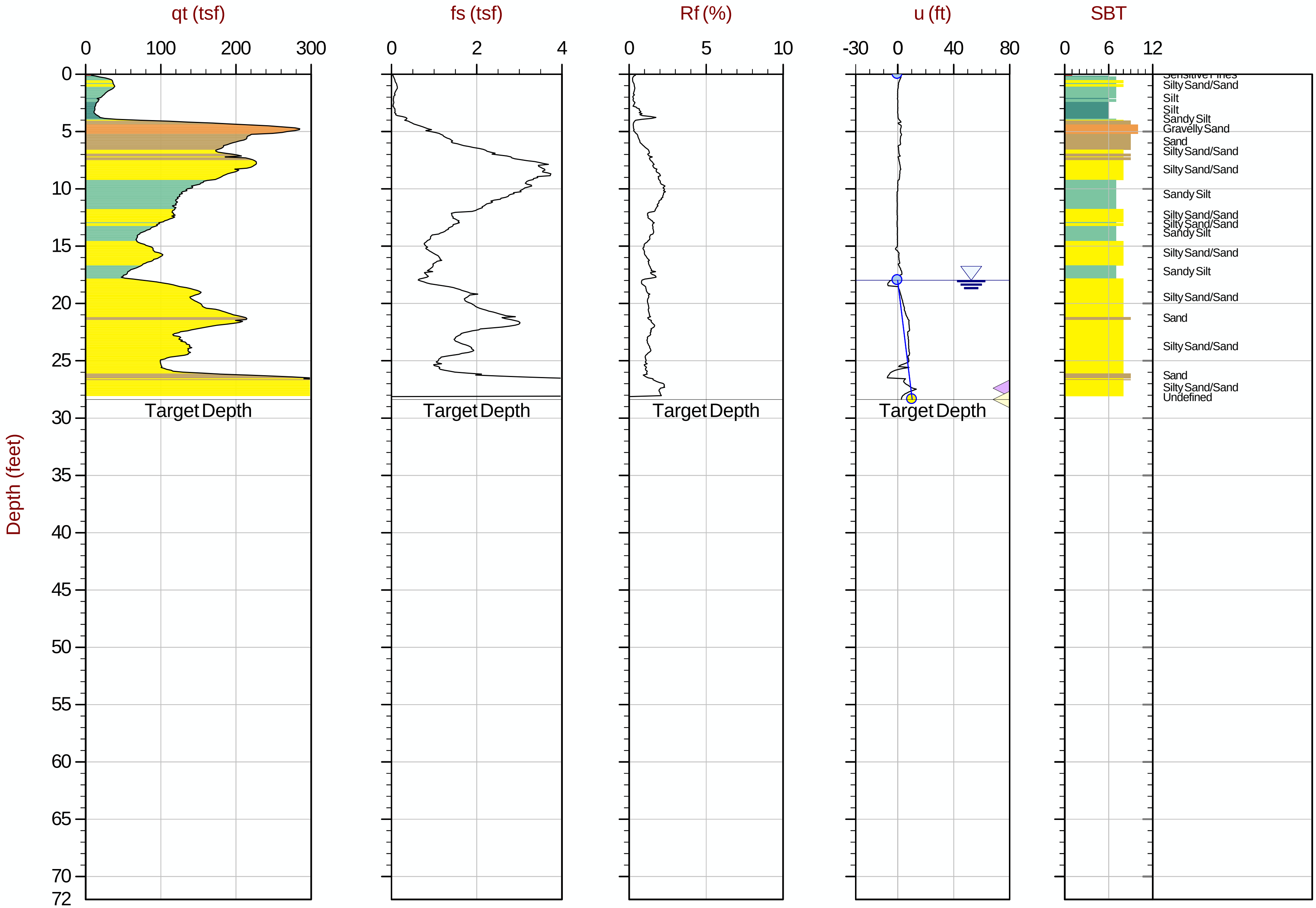
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-29 09:49
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-34
Cone: 361:T1500F15U500



Max Depth: 8.650 m / 28.38 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP34.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409534m E: 503216m

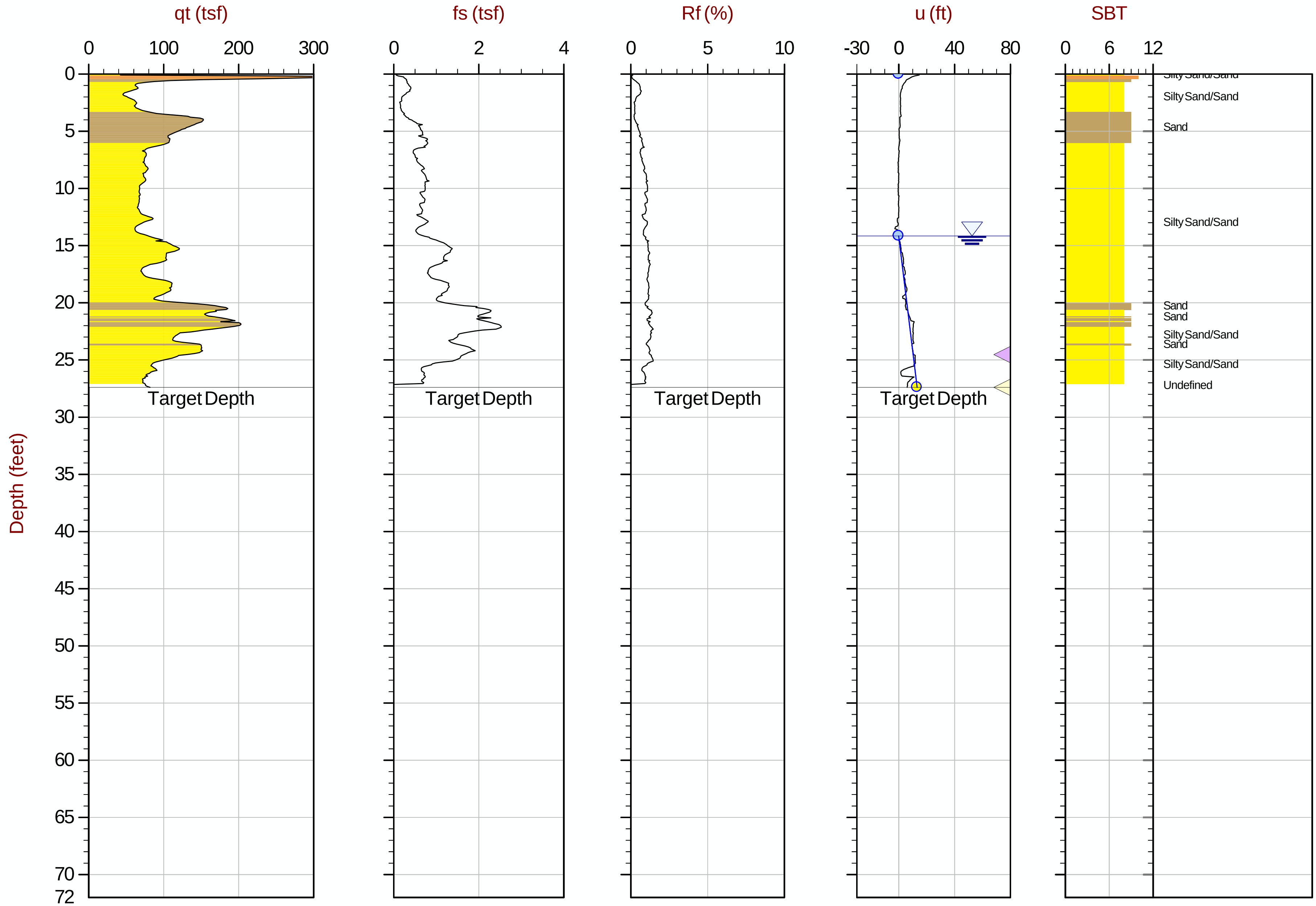
Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-29 11:10
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-35
Cone: 361:T1500F15U500



Max Depth: 8.350 m / 27.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP35.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409554m E: 503186m

Hydrostatic Line Ueq Assumed Ueq PPD, Ueq achieved PPD, Ueq not achieved

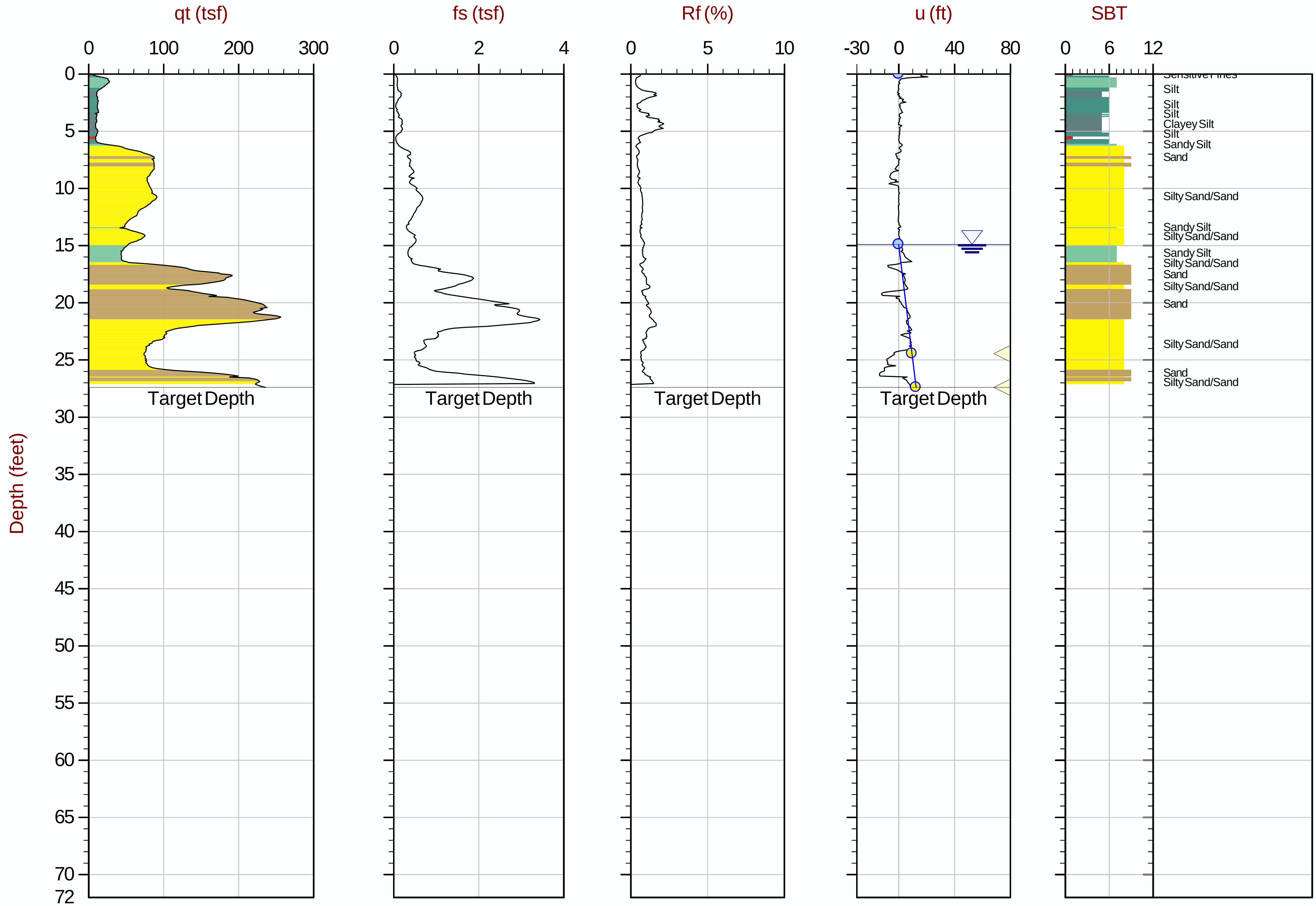
The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

EHS Support

Job No: 17-53125
Date: 2017-09-29 13:01
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-36
Cone: 361:T1500F15U500



Max Depth: 8.350 m / 27.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 17-53125_CP36.COR

SBT: Robertson and Campanella, 1986
Coords: UTM Zone 18 N: 4409527m E: 503202m

Hydrostatic Line   Ueq   Assumed Ueq   PPD, Ueq achieved   PPD, Ueq not achieved

The reported coordinates were acquired from consumer-grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

ConeTec

Job No:	17-53125
Client:	EHS Support
Project:	The Paint Company, Gibbsboro, NJ
Start Date:	19-Sep-2017
End Date:	29-Sep-2017

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)
CPT/MIP17-01	17-53125_CP01.PPD	15	300	30.27	20.18	10.08	
CPT/MIP17-02	17-53125_CP02.PPD	15	200	26.57	13.02	13.56	
CPT/MIP17-03A	17-53125_CP03A.PPD	15	200	23.54	12.87	10.67	
CPT/MIP17-03A	17-53125_CP03A.PPD	15	315	33.63	22.87	10.76	
CPT/MIP17-04	17-53125_CP04.PPD	15	400	32.32	22.47	9.84	
CPT/MIP17-05	17-53125_CP05.PPD	15	400	20.59	11.13	9.46	
CPT/MIP17-06	17-53125_CP06.PPD	15	200	17.47	10.33	7.14	
CPT/MIP17-07	17-53125_CP07.PPD	15	400	9.76	4.45	5.31	
CPT/MIP17-07	17-53125_CP07.PPD	15	600	22.56	18.22	4.34	
CPT/MIP17-08	17-53125_CP08.PPD	15	500	36.58	27.96	8.62	
CPT/MIP17-09	17-53125_CP09.PPD	15	405	12.80	8.04	4.76	
CPT/MIP17-09	17-53125_CP09.PPD	15	300	13.78	8.91	4.87	
CPT/MIP17-10	17-53125_CP10.PPD	15	900	12.47	8.95	3.52	
CPT/MIP17-10	17-53125_CP10.PPD	15	300	15.42	11.49	3.93	
CPT/MIP17-11	17-53125_CP11.PPD	15	300	17.72	13.24	4.48	
CPT/MIP17-11	17-53125_CP11.PPD	15	200	21.65	16.87	4.78	
CPT/MIP17-12	17-53125_CP12.PPD	15	1000	42.81	35.09	7.72	
CPT/MIP17-13	17-53125_CP13.PPD	15	700	35.43	27.64	7.80	

Job No: 17-53125
Client: EHS Support
Project: The Paint Company, Gibbsboro, NJ
Start Date: 19-Sep-2017
End Date: 29-Sep-2017

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)
CPT/MIP17-13	17-53125_CP13.PPD	15	300	42.49	34.55	7.94	
CPT/MIP17-14	17-53125_CP14.PPD	15	1200	43.39	40.18	3.21	
CPT/MIP17-15	17-53125_CP15.PPD	15	925	45.60	43.20	2.40	
CPT/MIP17-16	17-53125_CP16.PPD	15	300	25.51	22.98	2.53	
CPT/MIP17-16	17-53125_CP16.PPD	15	300	46.83	43.45	3.38	
CPT/MIP17-17	17-53125_CP17.PPD	15	500	27.64	12.87	14.77	
CPT/MIP17-18	17-53125_CP18.PPD	15	300	20.92	11.49	9.42	
CPT/MIP17-19	17-53125_CP19.PPD	15	300	29.61	26.95	2.66	
CPT/MIP17-19	17-53125_CP19.PPD	15	1905	42.73			
CPT/MIP17-20	17-53125_CP20.PPD	15	900	45.44	41.60	3.84	
CPT/MIP17-21	17-53125_CP21.PPD	15	300	21.65	18.84	2.82	
CPT/MIP17-22	17-53125_CP22.PPD	15	300	42.65	29.13	13.52	
CPT/MIP17-23	17-53125_CP23.PPD	15	95	48.47	44.91	3.57	
CPT/MIP17-23	17-53125_CP23.PPD	15	405	49.46	46.25	3.20	
CPT/MIP17-23	17-53125_CP23.PPD	15	300	54.46	50.98	3.48	
CPT/MIP17-24	17-53125_CP24.PPD	15	1500	47.65	43.45	4.20	
CPT/MIP17-25	17-53125_CP25.PPD	15	200	32.64	19.96	12.68	
CPT/MIP17-25	17-53125_CP25.PPD	15	245	42.57			

Job No: 17-53125
Client: EHS Support
Project: The Paint Company, Gibbsboro, NJ
Start Date: 19-Sep-2017
End Date: 29-Sep-2017

CPTu PORE PRESSURE DISSIPATION SUMMARY

Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)
CPT/MIP17-26	17-53125_CP26.PPD	15	400	31.66	19.05	12.61	
CPT/MIP17-26	17-53125_CP26.PPD	15	500	62.99	49.09	13.90	
CPT/MIP17-27	17-53125_CP27.PPD	15	400	22.80	9.60	13.20	
CPT/MIP17-27	17-53125_CP27.PPD	15	305	66.11	53.02	13.09	
CPT/MIP17-28	17-53125_CP28.PPD	15	300	42.32	29.36	12.96	
CPT/MIP17-28	17-53125_CP28.PPD	15	300	64.39	51.05	13.33	
CPT/MIP17-29	17-53125_CP29.PPD	15	300	31.41	14.11	17.30	
CPT/MIP17-29	17-53125_CP29.PPD	15	85	48.39	31.45	16.94	
CPT/MIP17-29	17-53125_CP29.PPD	15	265	69.47	52.14	17.33	
CPT/MIP17-30	17-53125_CP30.PPD	15	1510	57.41	49.31	8.11	
CPT/MIP17-30	17-53125_CP30.PPD	15	200	60.28	51.27	9.01	
CPT/MIP17-30	17-53125_CP30.PPD	15	200	66.52	55.64	10.88	
CPT/MIP17-32	17-53125_CP32.PPD	15	300	24.52	9.16	15.36	
CPT/MIP17-32	17-53125_CP32.PPD	15	700	27.56	12.27	15.29	
CPT/MIP17-33	17-53125_CP33.PPD	15	610	24.36	8.33	16.03	
CPT/MIP17-33	17-53125_CP33.PPD	15	300	27.23	11.27	15.96	
CPT/MIP17-34	17-53125_CP34.PPD	15	300	27.39			
CPT/MIP17-34	17-53125_CP34.PPD	15	200	28.38	10.40	17.98	

Job No: 17-53125
Client: EHS Support
Project: The Paint Company, Gibbsboro, NJ
Start Date: 19-Sep-2017
End Date: 29-Sep-2017

CPTu PORE PRESSURE DISSIPATION SUMMARY

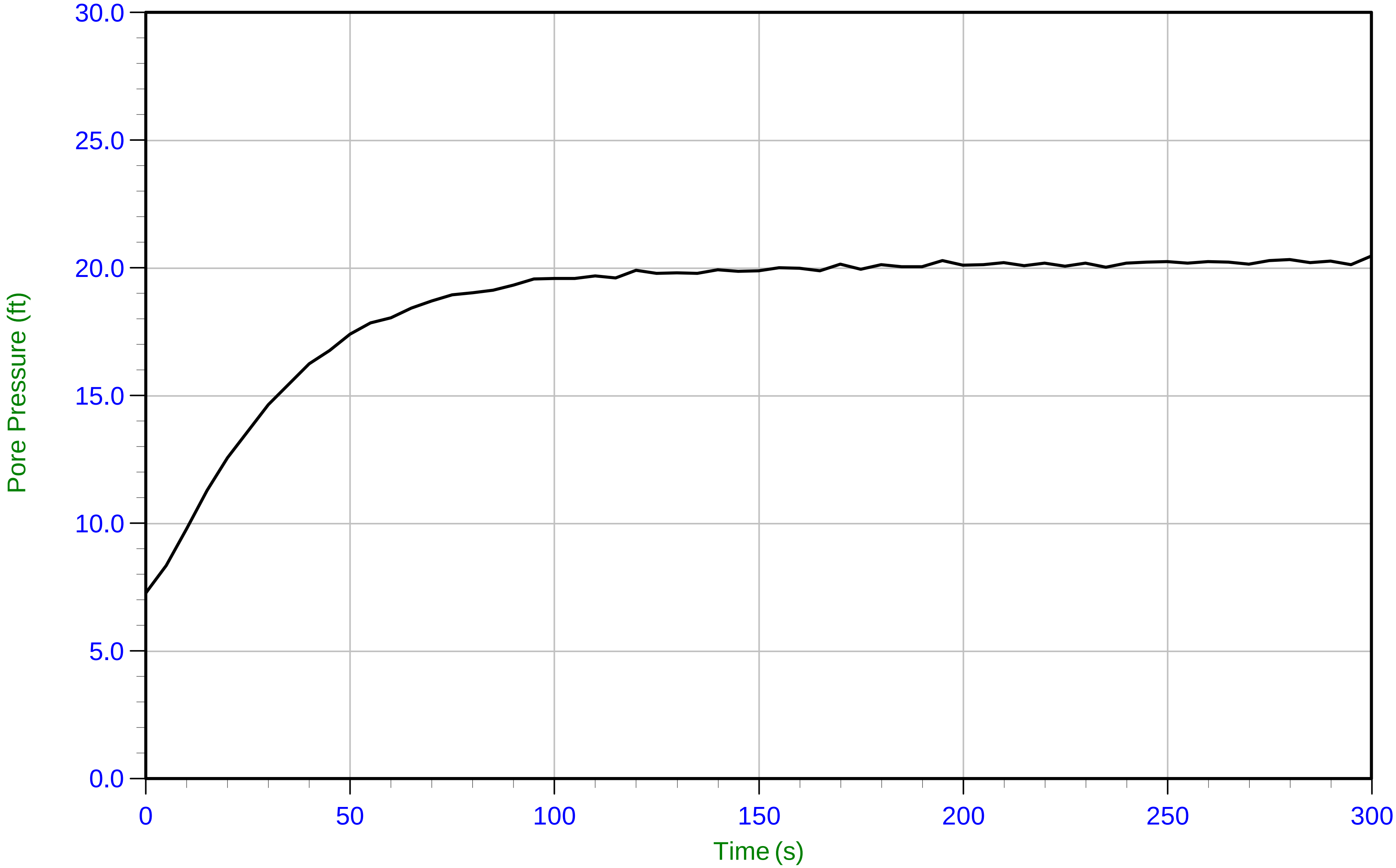
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)	Estimated Phreatic Surface (ft)
CPT/MIP17-35	17-53125_CP35.PPD	15	300	24.52			
CPT/MIP17-35	17-53125_CP35.PPD	15	500	27.39	13.24	14.16	
CPT/MIP17-36	17-53125_CP36.PPD	15	305	24.44	9.55	14.90	
CPT/MIP17-36	17-53125_CP36.PPD	15	310	27.39	12.36	15.03	
Totals	58 dissipations		441.4 min				

CONETEC

EHS Support

Job No: 17-53125
Date: 19-Sep-2017 11:35:06
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-01
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP01.PPD
Depth: 9.225 m / 30.265 ft
Duration: 300.0 s

U Min: 7.3 ft
U Max: 20.5 ft

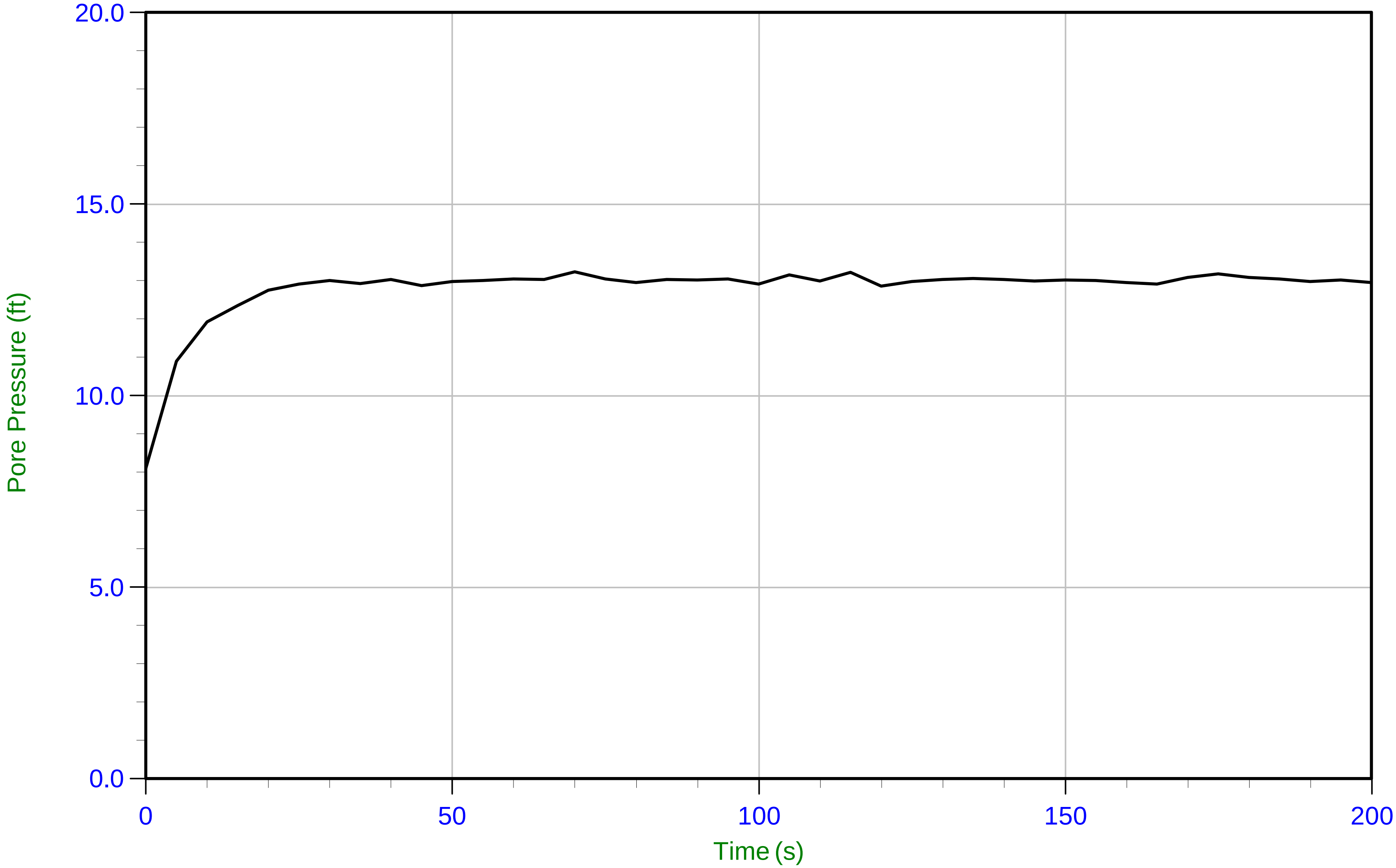
WT: 3.074 m / 10.084 ft
Ueq: 20.2 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 19-Sep-2017 13:42:35
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-02
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP02.PPD
Depth: 8.100 m / 26.574 ft
Duration: 200.0 s

U Min: 8.1 ft
U Max: 13.2 ft

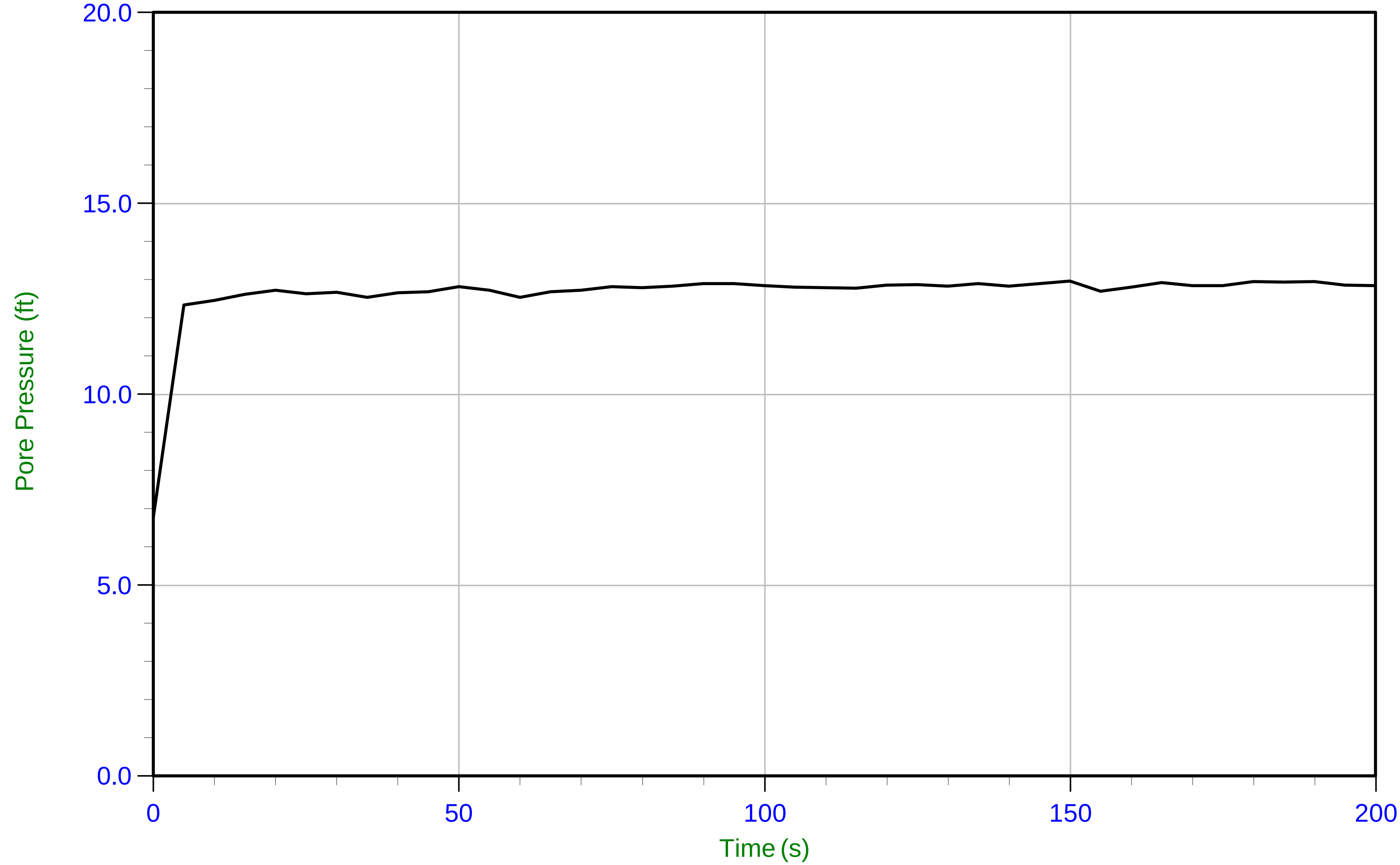
WT: 4.132 m / 13.556 ft
Ueq: 13.0 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 19-Sep-2017 15:31:31
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-03A
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP03A.PPD
Depth: 7.175 m / 23.540 ft
Duration: 200.0 s

U Min: 6.8 ft
U Max: 13.0 ft

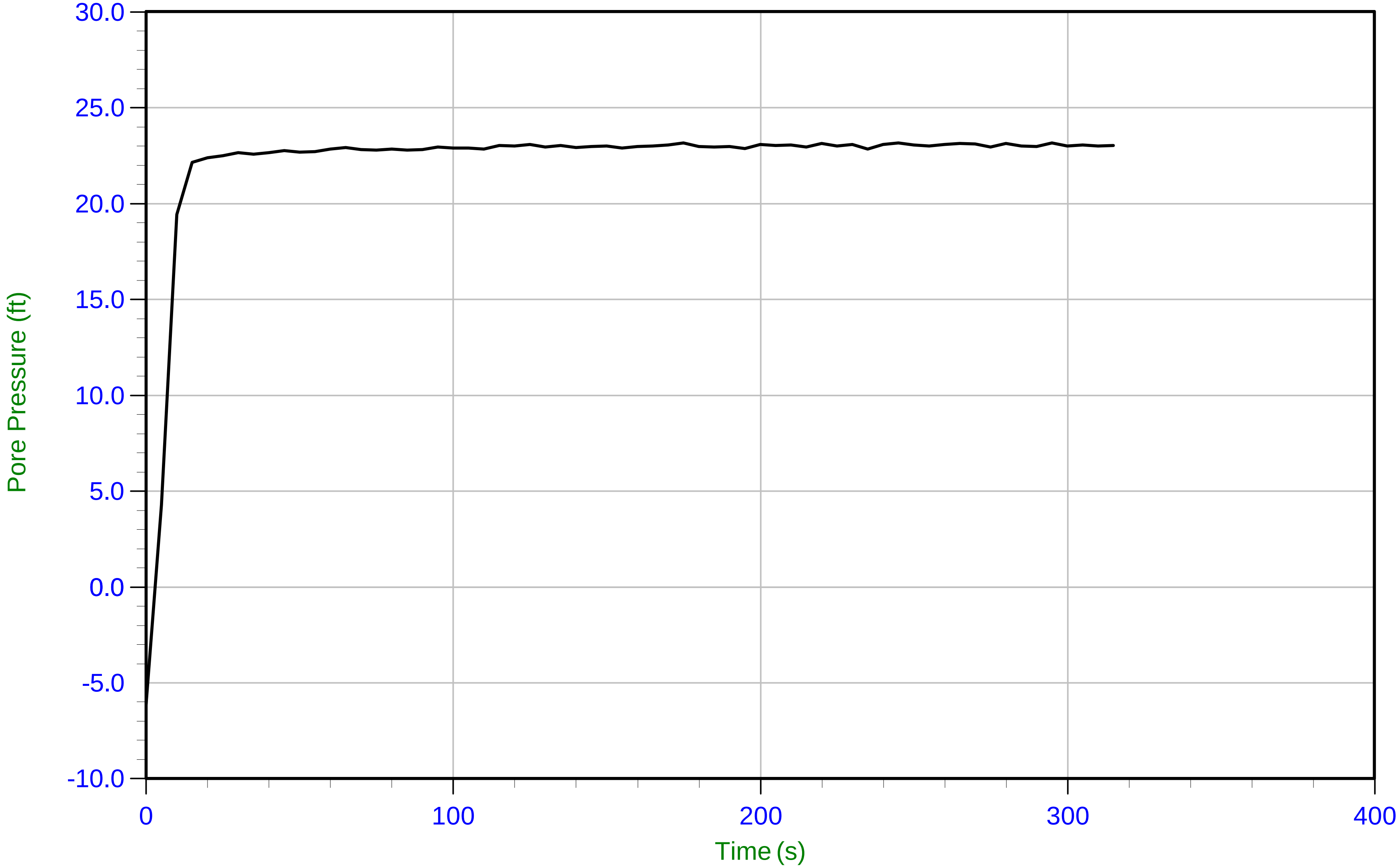
WT: 3.251 m / 10.667 ft
Ueq: 12.9 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 19-Sep-2017 15:31:31
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-03A
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP03A.PPD
Depth: 10.250 m / 33.628 ft
Duration: 315.0 s

U Min: -6.1 ft
U Max: 23.2 ft

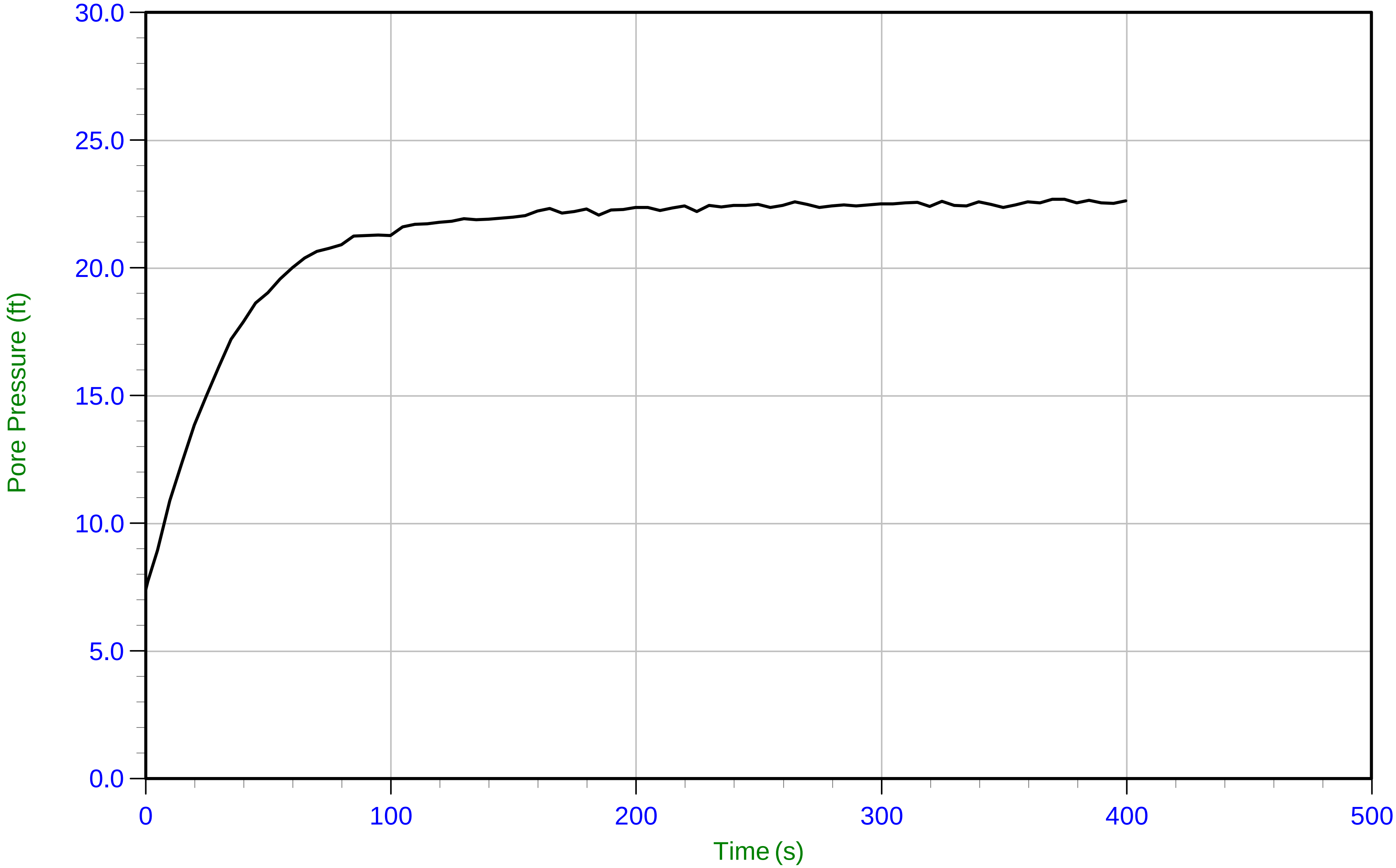
WT: 3.278 m / 10.756 ft
Ueq: 22.9 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 08:48:56
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-04
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP04.PPD
Depth: 9.850 m / 32.316 ft
Duration: 400.0 s

U Min: 7.4 ft
U Max: 22.7 ft

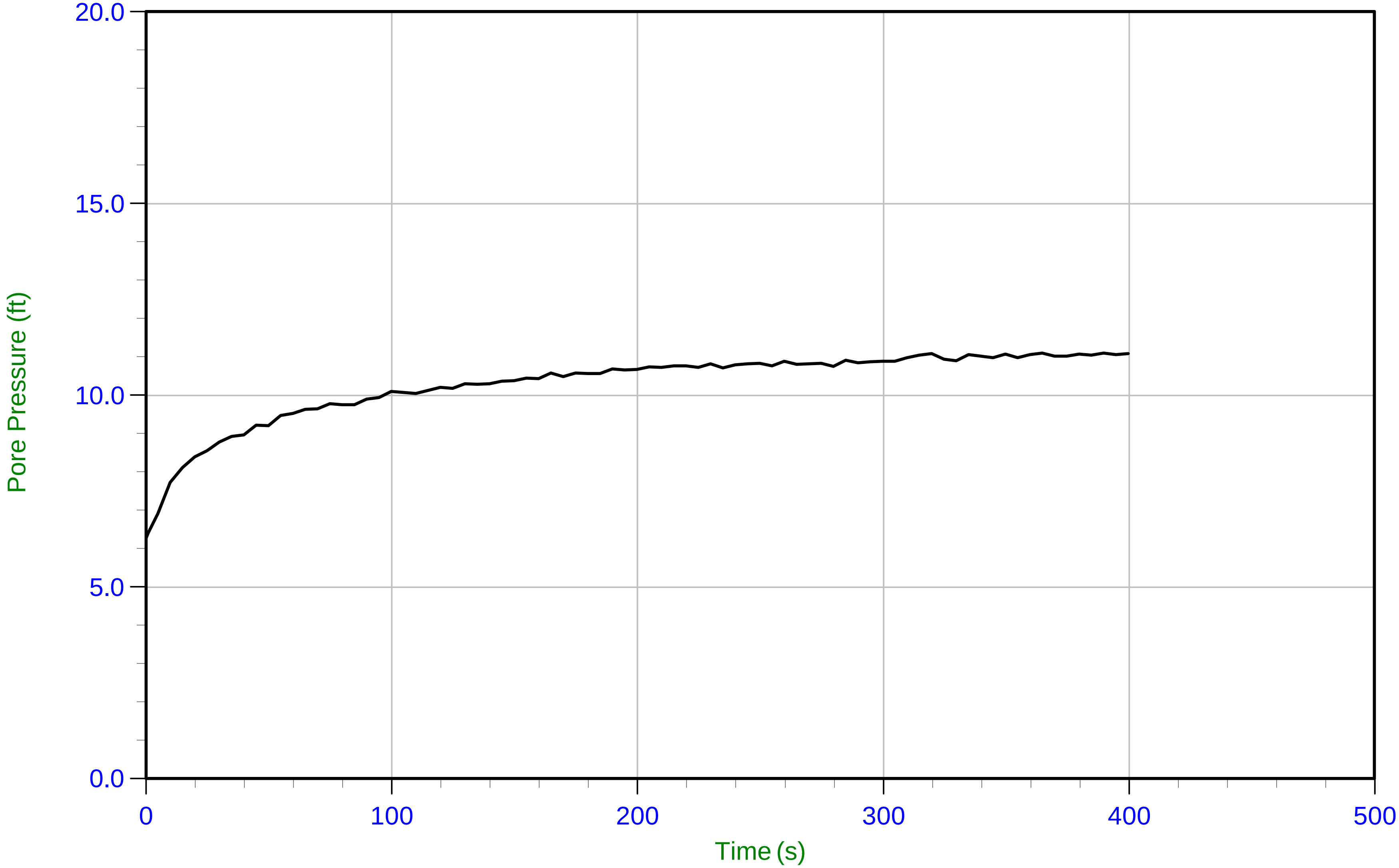
WT: 3.000 m / 9.843 ft
Ueq: 22.5 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 10:52:46
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-05
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP05.PPD
Depth: 6.275 m / 20.587 ft
Duration: 400.0 s

U Min: 6.3 ft
U Max: 11.1 ft

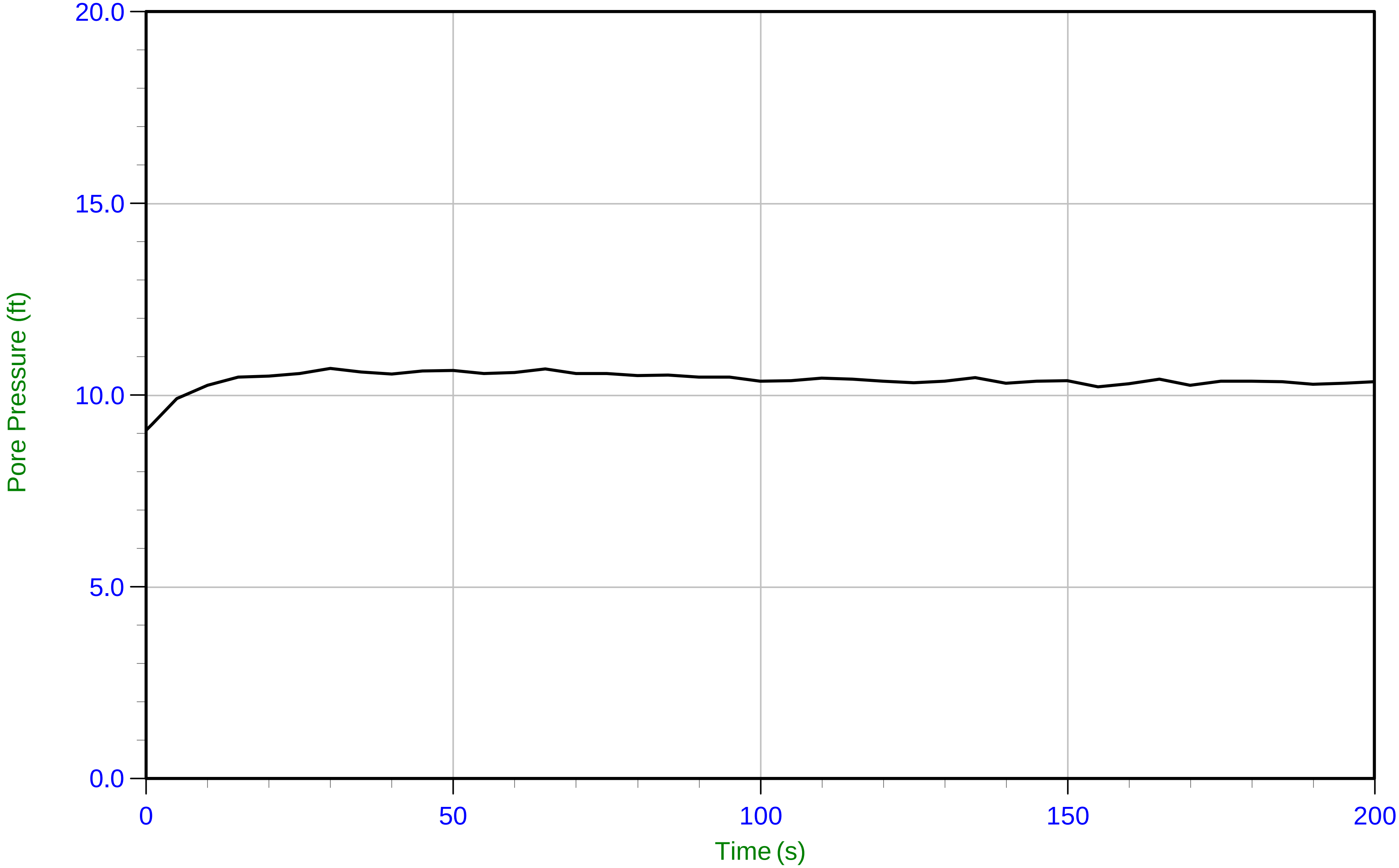
WT: 2.883 m / 9.460 ft
Ueq: 11.1 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 12:00:04
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-06
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP06.PPD
Depth: 5.325 m / 17.470 ft
Duration: 200.0 s

U Min: 9.1 ft
U Max: 10.7 ft

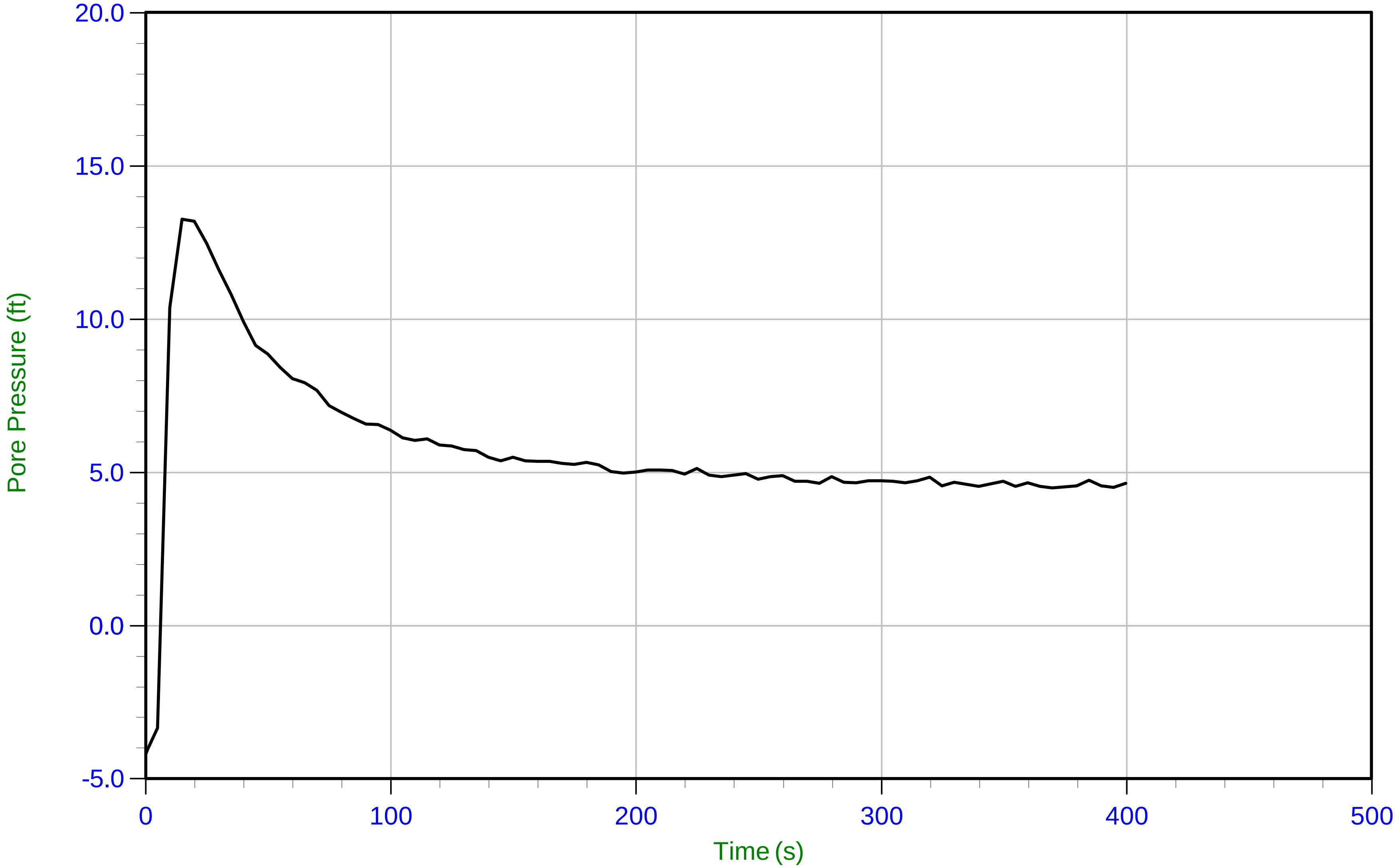
WT: 2.177 m / 7.143 ft
Ueq: 10.3 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 13:23:01
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-07
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP07.PPD
Depth: 2.975 m / 9.760 ft
Duration: 400.0 s

U Min: -4.2 ft
U Max: 13.3 ft

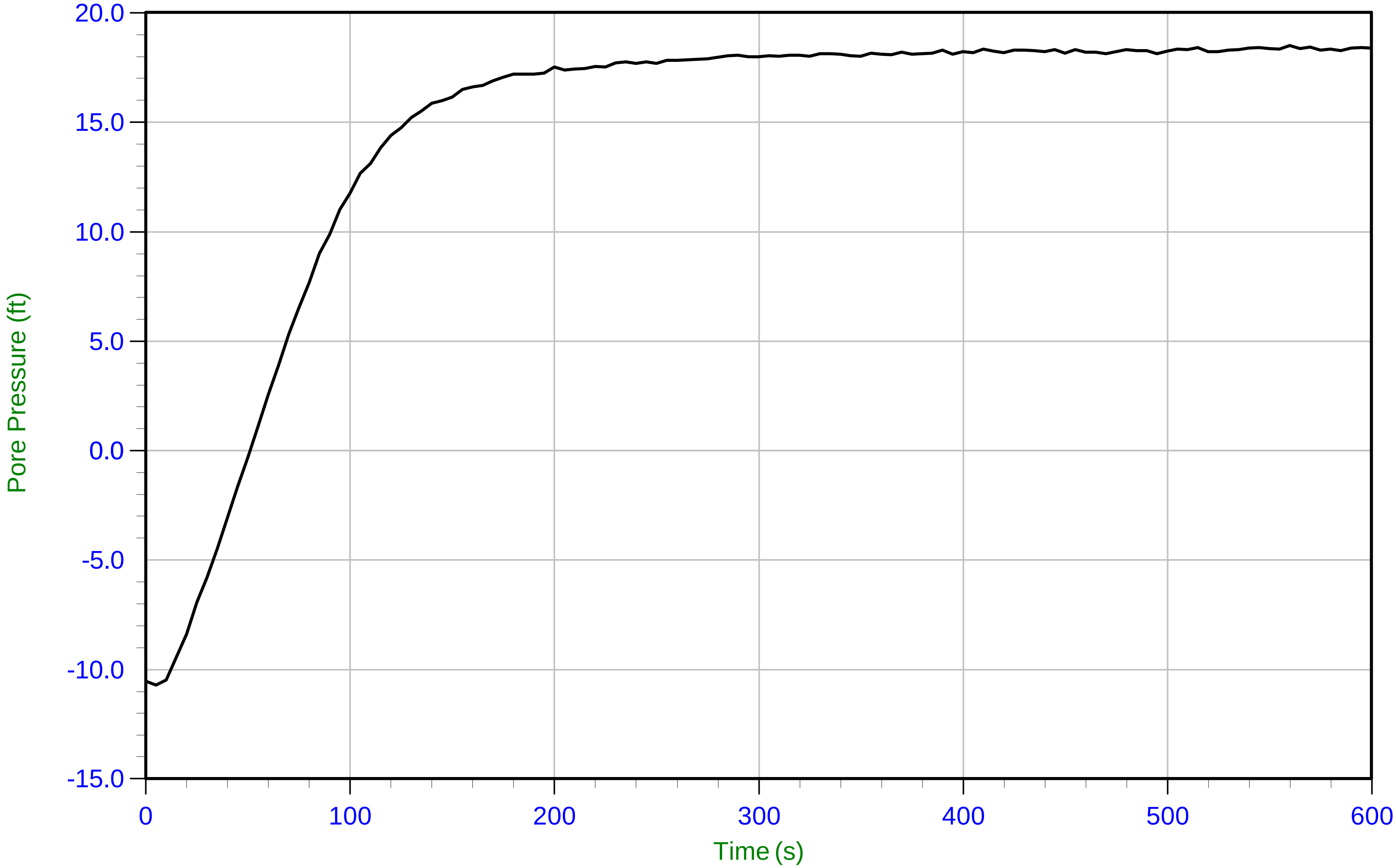
WT: 1.617 m / 5.306 ft
Ueq: 4.5 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 13:23:01
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-07
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP07.PPD
Depth: 6.875 m / 22.556 ft
Duration: 600.0 s

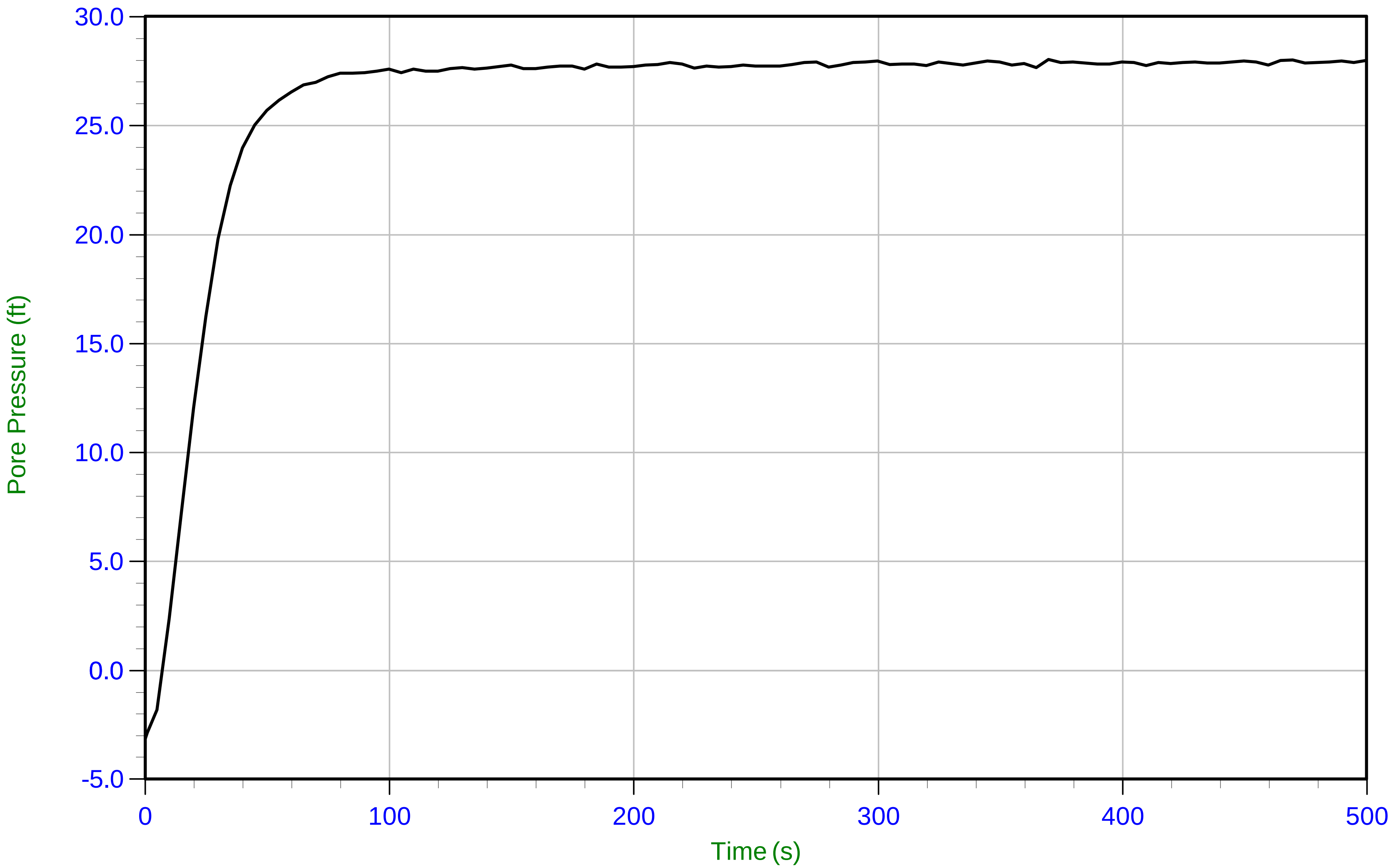
U Min: -10.7 ft
U Max: 18.5 ft

WT: 1.322 m / 4.338 ft
Ueq: 18.2 ft

EHS Support

Job No: 17-53125
Date: 20-Sep-2017 15:13:31
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-08
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP08.PPD
Depth: 11.150 m / 36.581 ft
Duration: 500.0 s

U Min: -3.1 ft
U Max: 28.0 ft

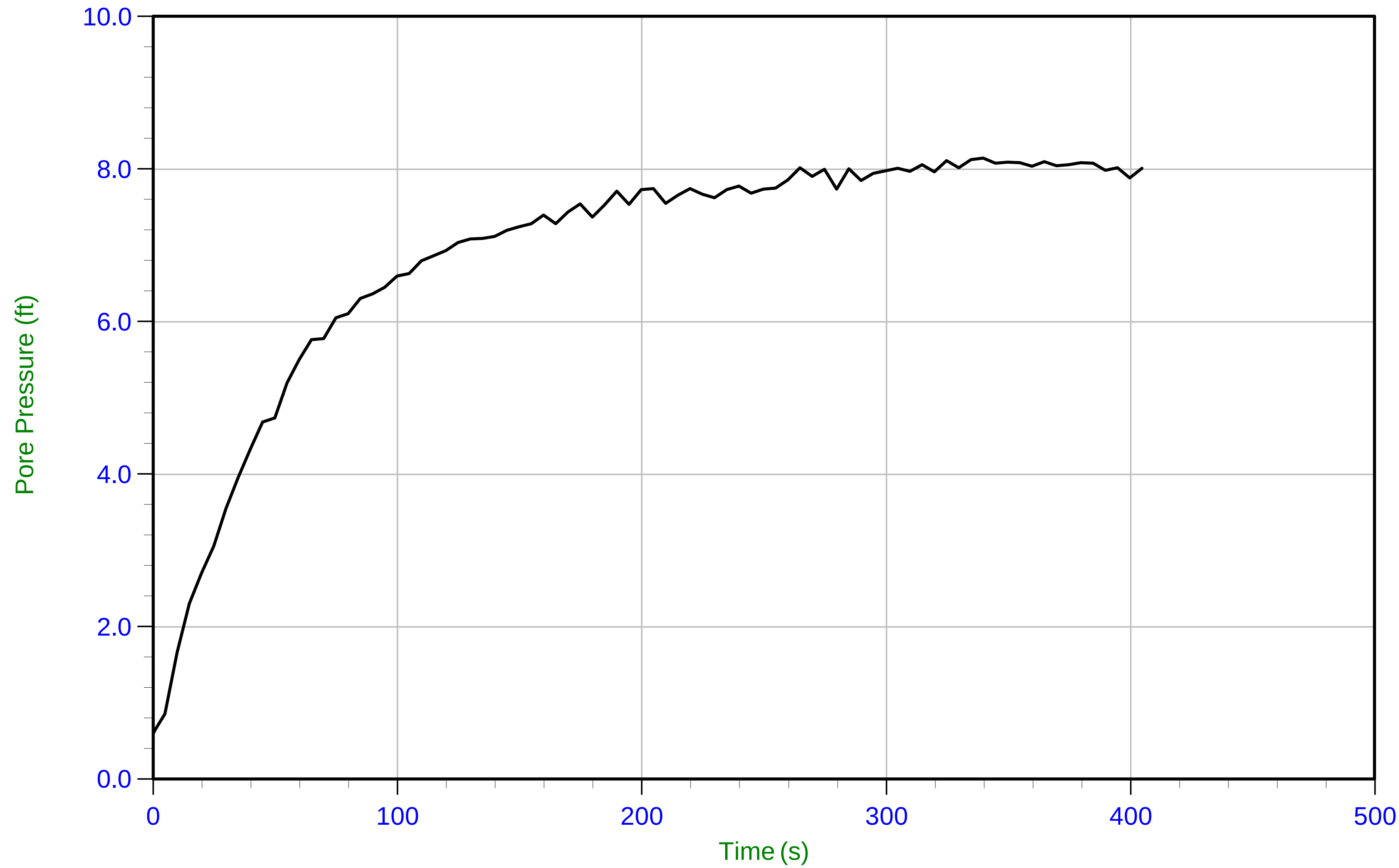
WT: 2.627 m / 8.618 ft
Ueq: 28.0 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 08:39:05
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-09
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP09.PPD
Depth: 3.900 m / 12.795 ft
Duration: 405.0 s

U Min: 0.6 ft
U Max: 8.1 ft

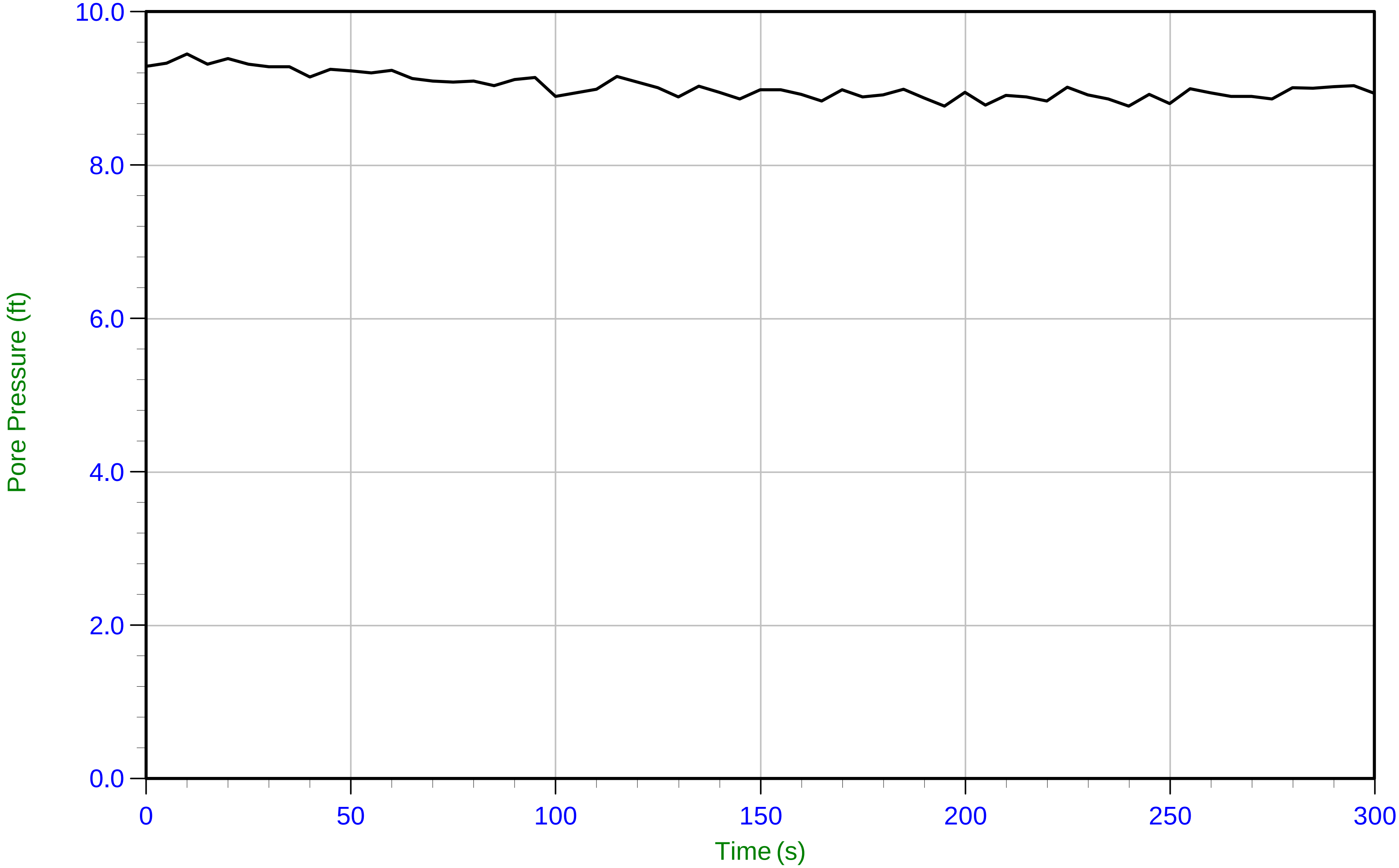
WT: 1.451 m / 4.759 ft
Ueq: 8.0 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 08:39:05
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-09
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP09.PPD
Depth: 4.200 m / 13.779 ft
Duration: 300.0 s

U Min: 8.8 ft
U Max: 9.5 ft

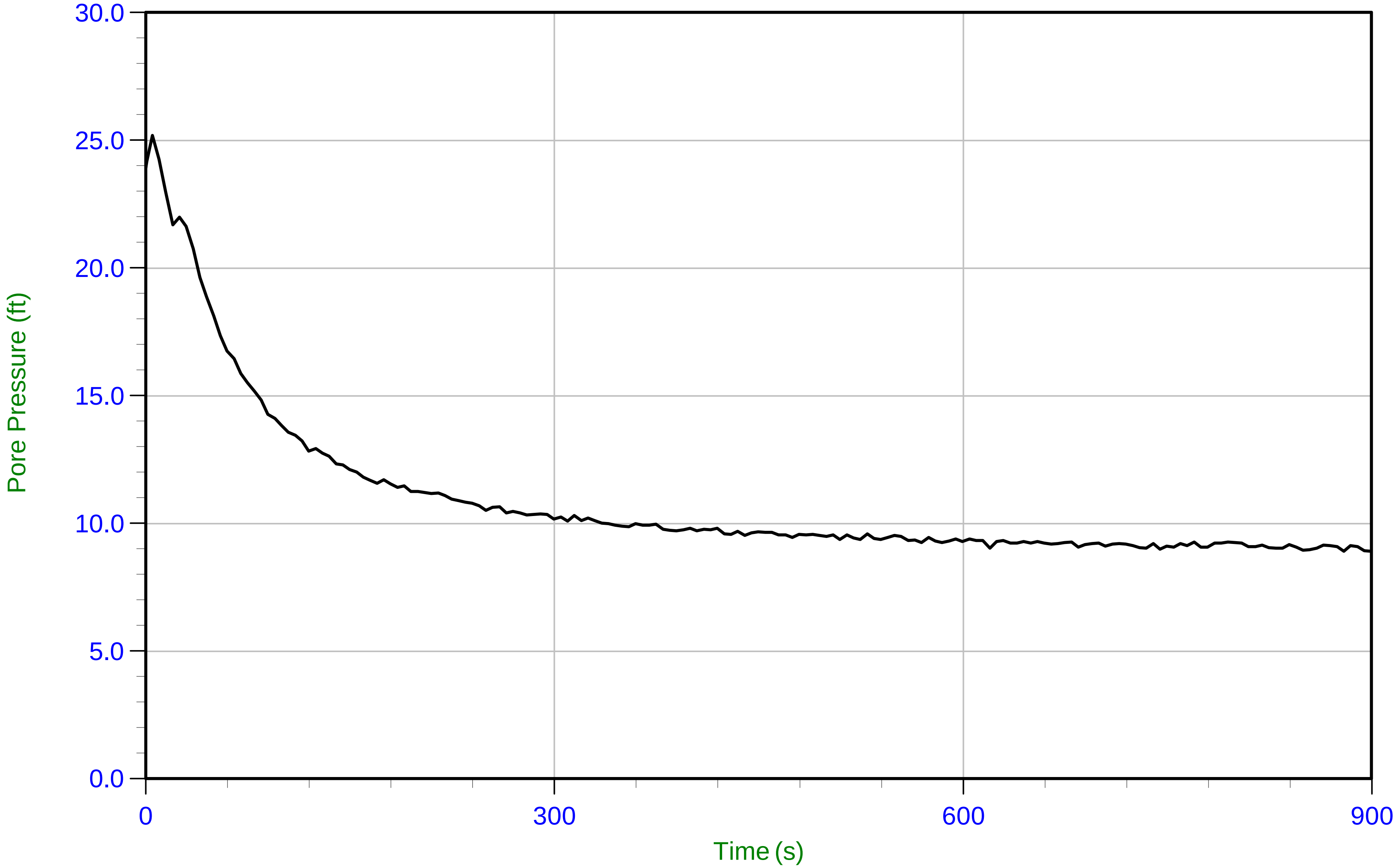
WT: 1.485 m / 4.870 ft
Ueq: 8.9 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 09:43:49
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-10
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP10.PPD
Depth: 3.800 m / 12.467 ft
Duration: 900.0 s

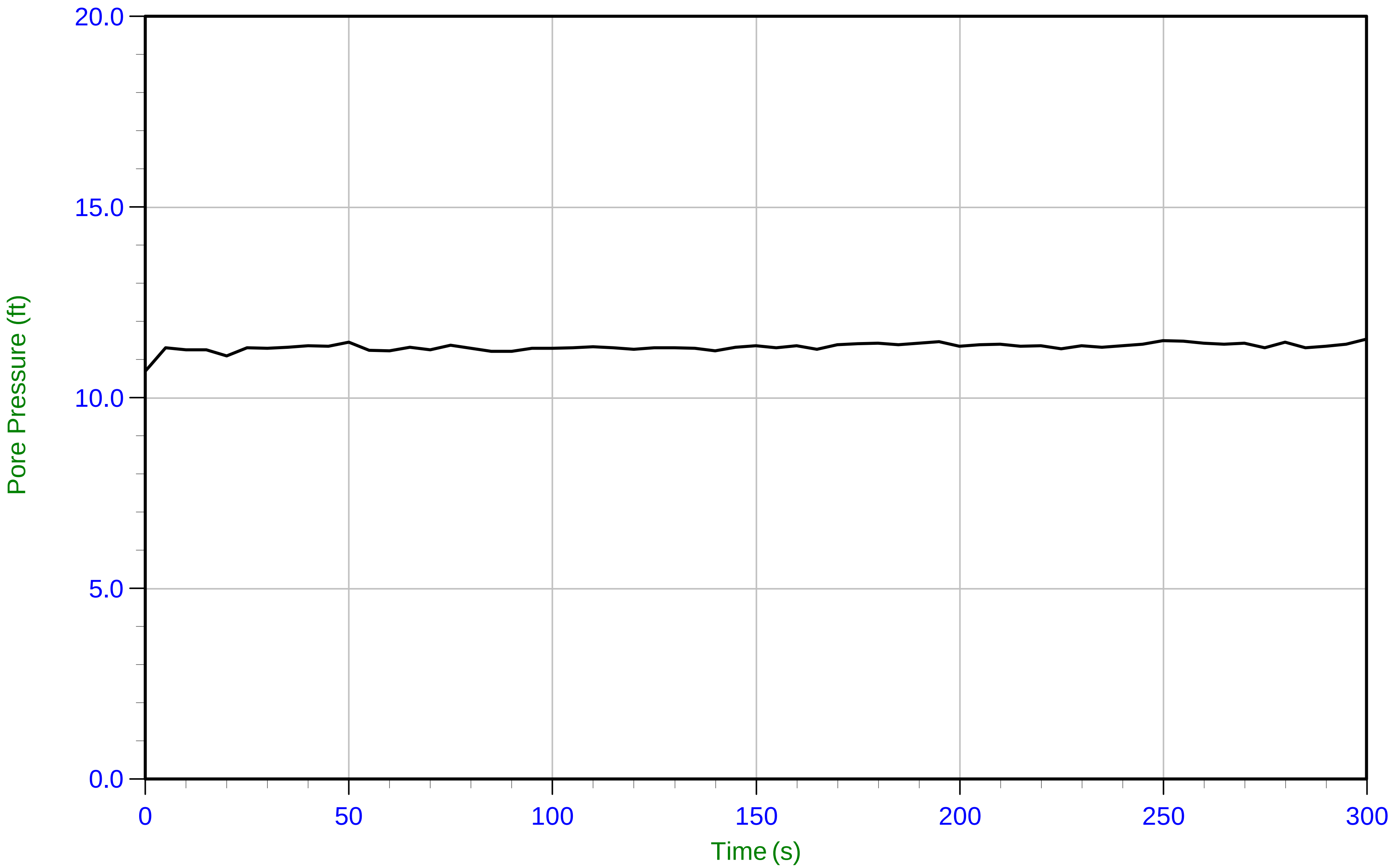
U Min: 8.9 ft
U Max: 25.2 ft

WT: 1.073 m / 3.522 ft
Ueq: 8.9 ft

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 09:43:49
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-10
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP10.PPD
Depth: 4.700 m / 15.420 ft
Duration: 300.0 s

U Min: 10.7 ft
U Max: 11.5 ft

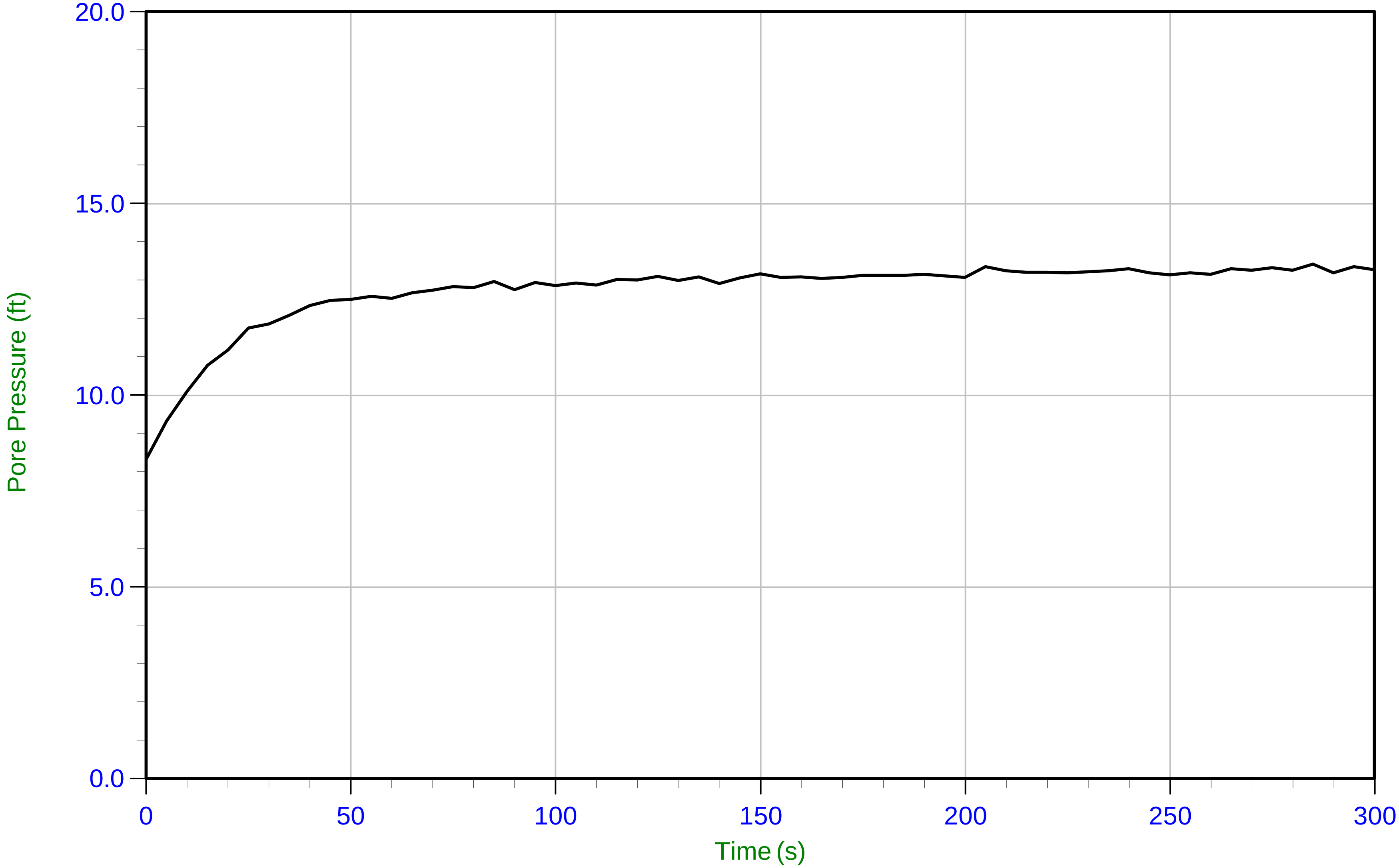
WT: 1.198 m / 3.929 ft
Ueq: 11.5 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 10:52:58
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-11
Cone: AD361 Area=15 cm²



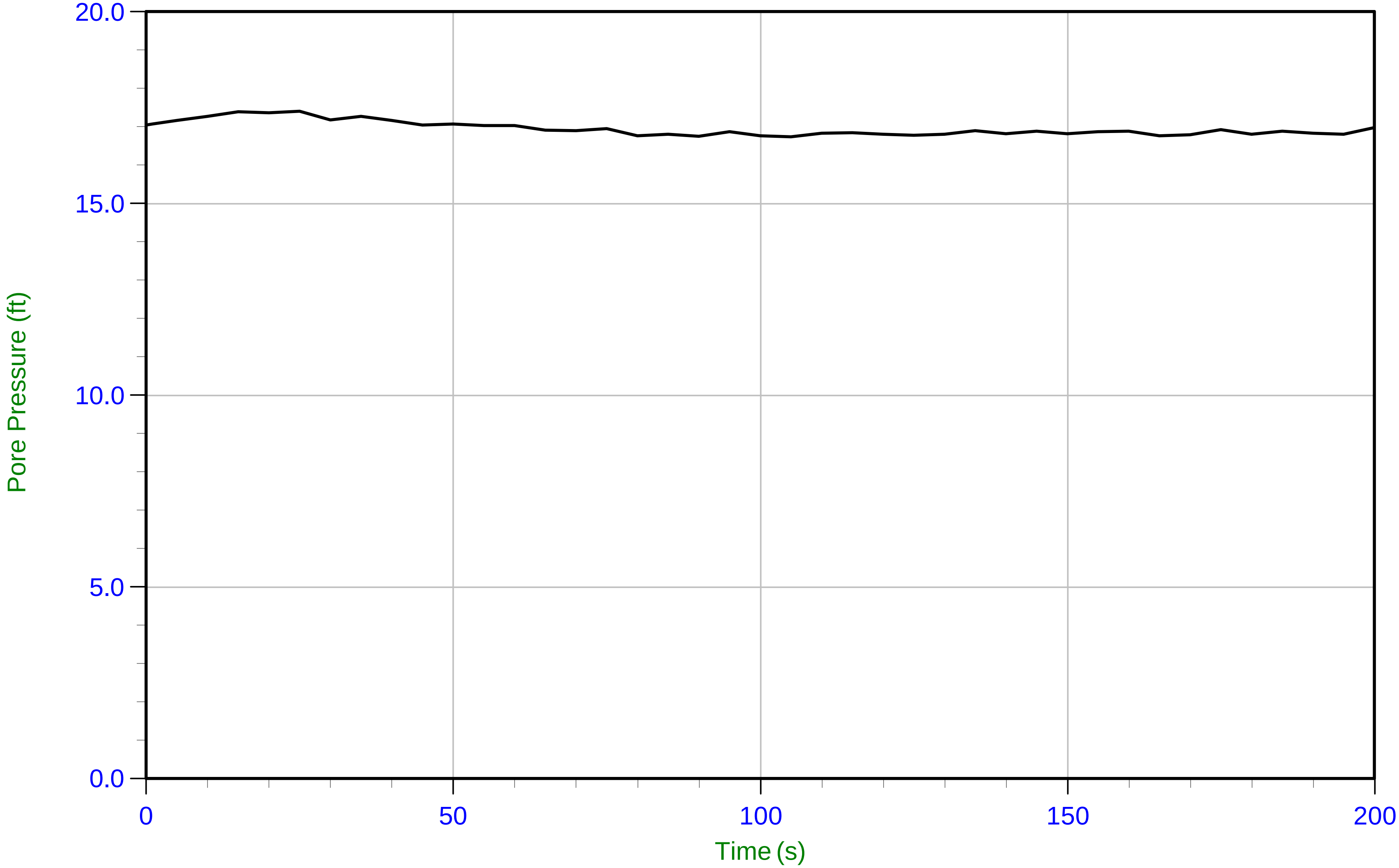
Trace Summary:	Filename: 17-53125_CP11.PPD	U Min: 8.3 ft	WT: 1.366 m / 4.480 ft
	Depth: 5.400 m / 17.716 ft	U Max: 13.4 ft	Ueq: 13.2 ft
	Duration: 300.0 s		

CONETEC

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 10:52:58
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-11
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP11.PPD
Depth: 6.600 m / 21.653 ft
Duration: 200.0 s

U Min: 16.7 ft
U Max: 17.4 ft

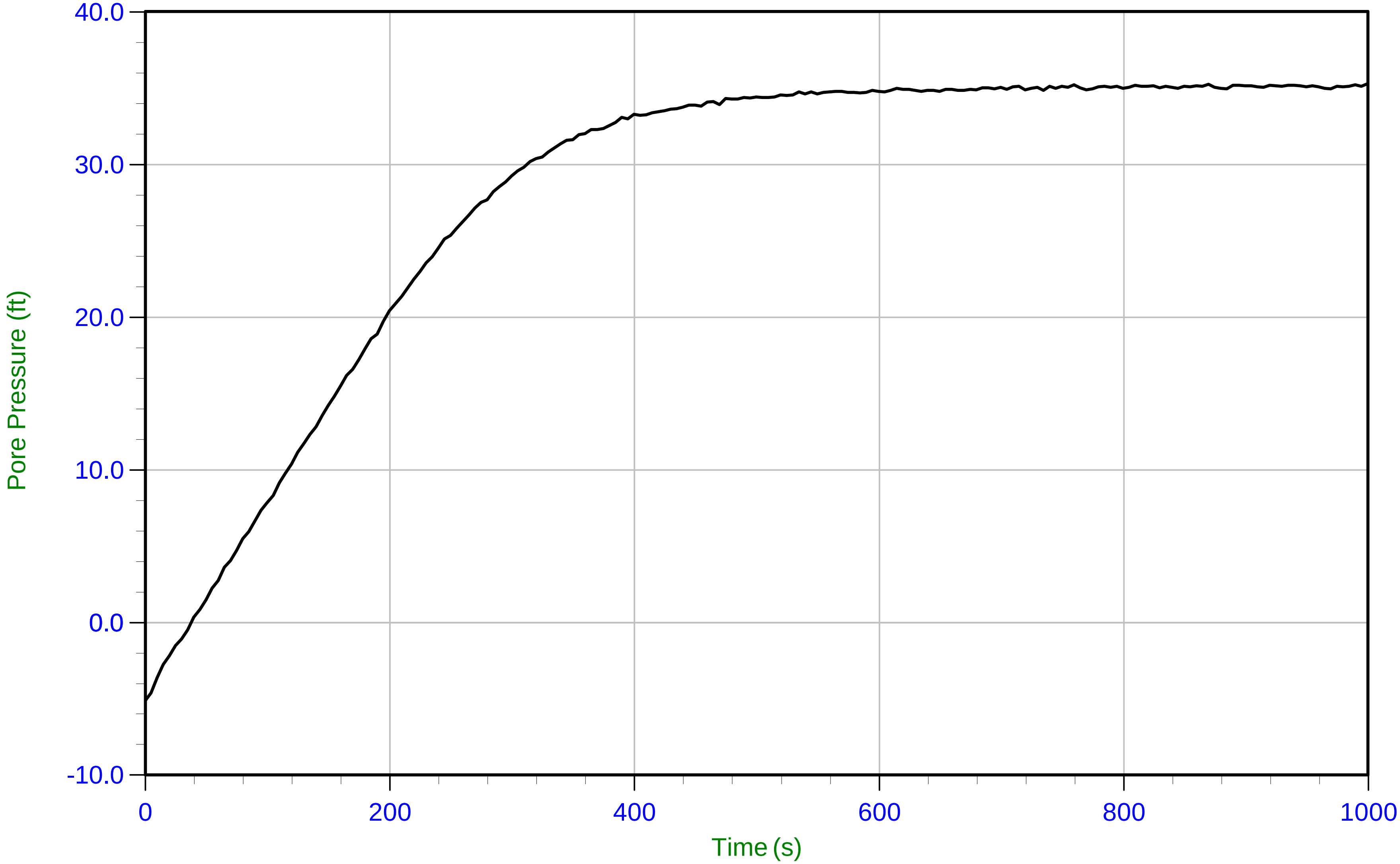
WT: 1.457 m / 4.781 ft
Ueq: 16.9 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 12:59:47
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-12
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP12.PPD
Depth: 13.050 m / 42.814 ft
Duration: 1000.0 s

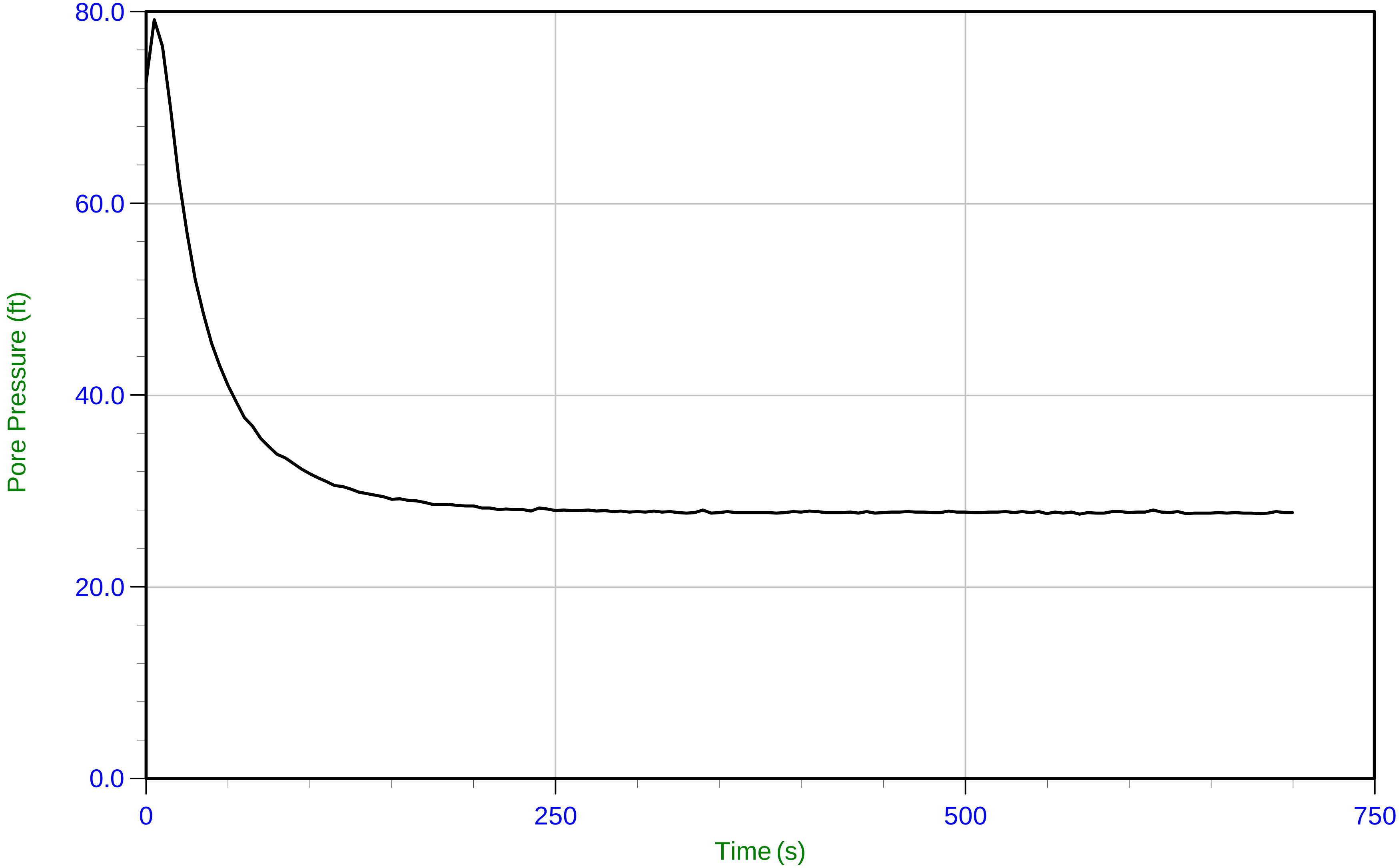
U Min: -5.1 ft
U Max: 35.3 ft

WT: 2.354 m / 7.724 ft
Ueq: 35.1 ft

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 14:44:52
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-13
Cone: AD361 Area=15 cm²



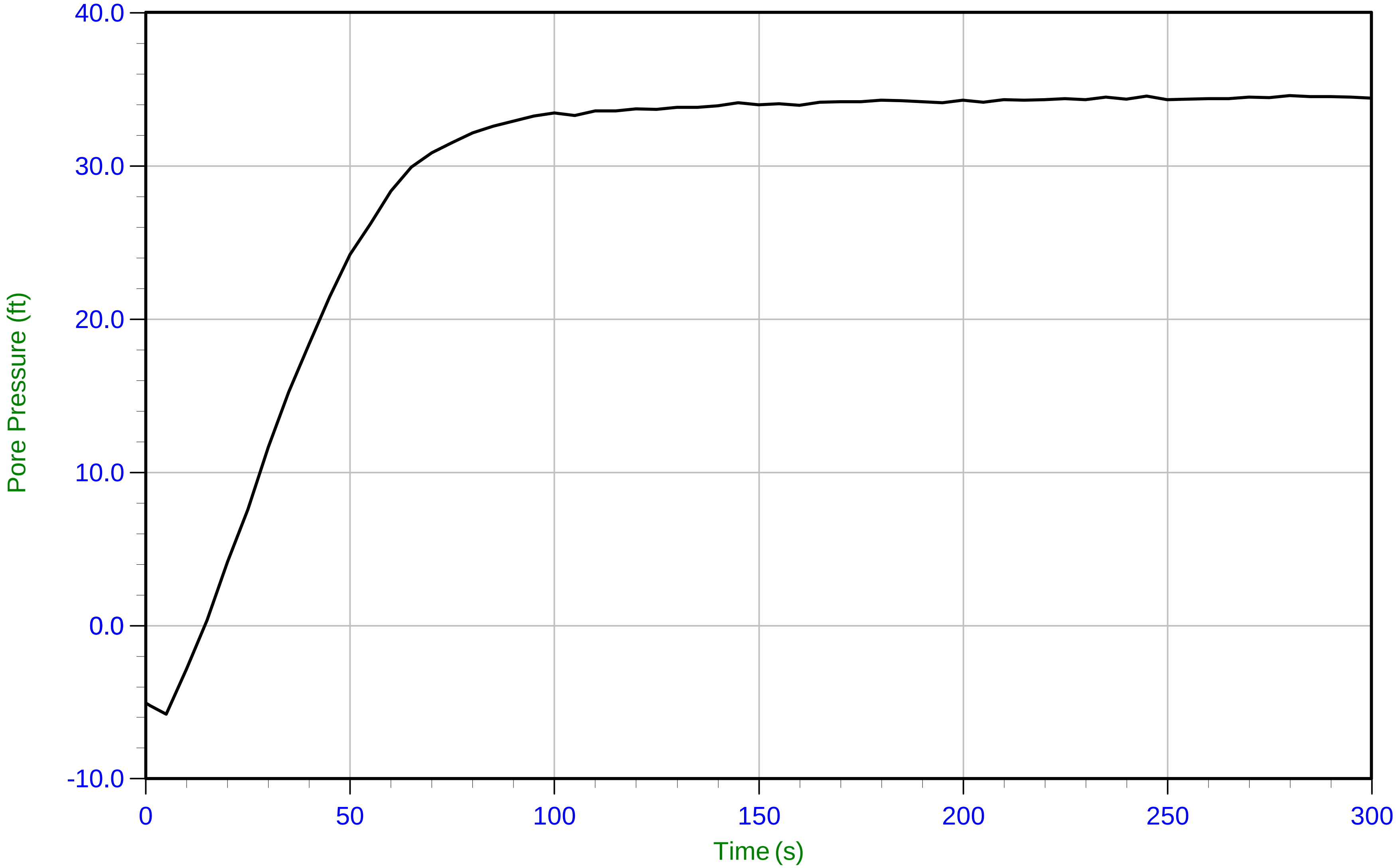
Trace Summary:

Filename: 17-53125_CP13.PPD	U Min: 27.6 ft	WT: 2.376 m / 7.797 ft
Depth: 10.800 m / 35.433 ft	U Max: 79.2 ft	Ueq: 27.6 ft
Duration: 700.0 s		

EHS Support

Job No: 17-53125
Date: 21-Sep-2017 14:44:52
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-13
Cone: AD361 Area=15 cm²



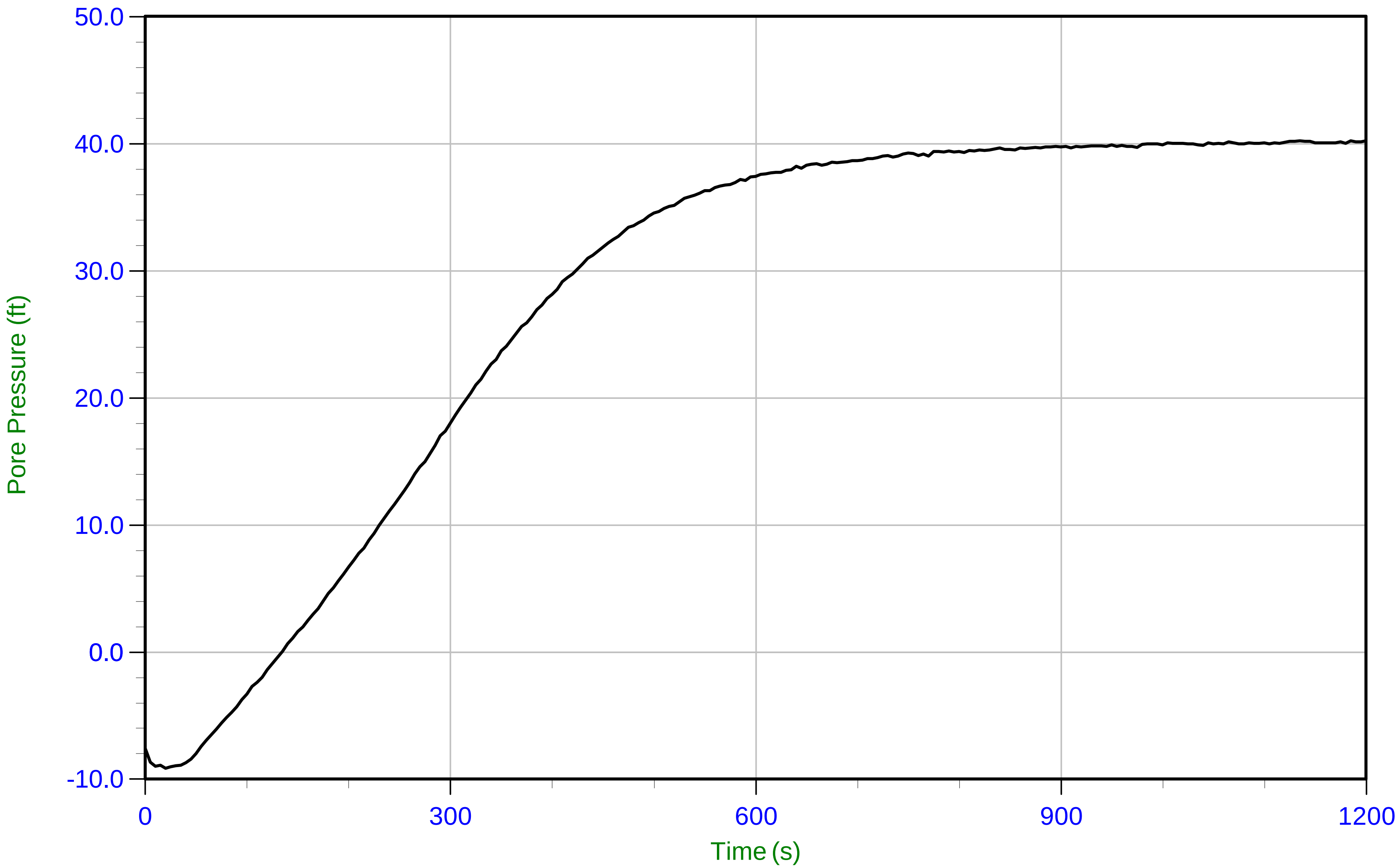
Trace Summary:

Filename: 17-53125_CP13.PPD
Depth: 12.950 m / 42.486 ft
Duration: 300.0 s

U Min: -5.8 ft
U Max: 34.6 ft

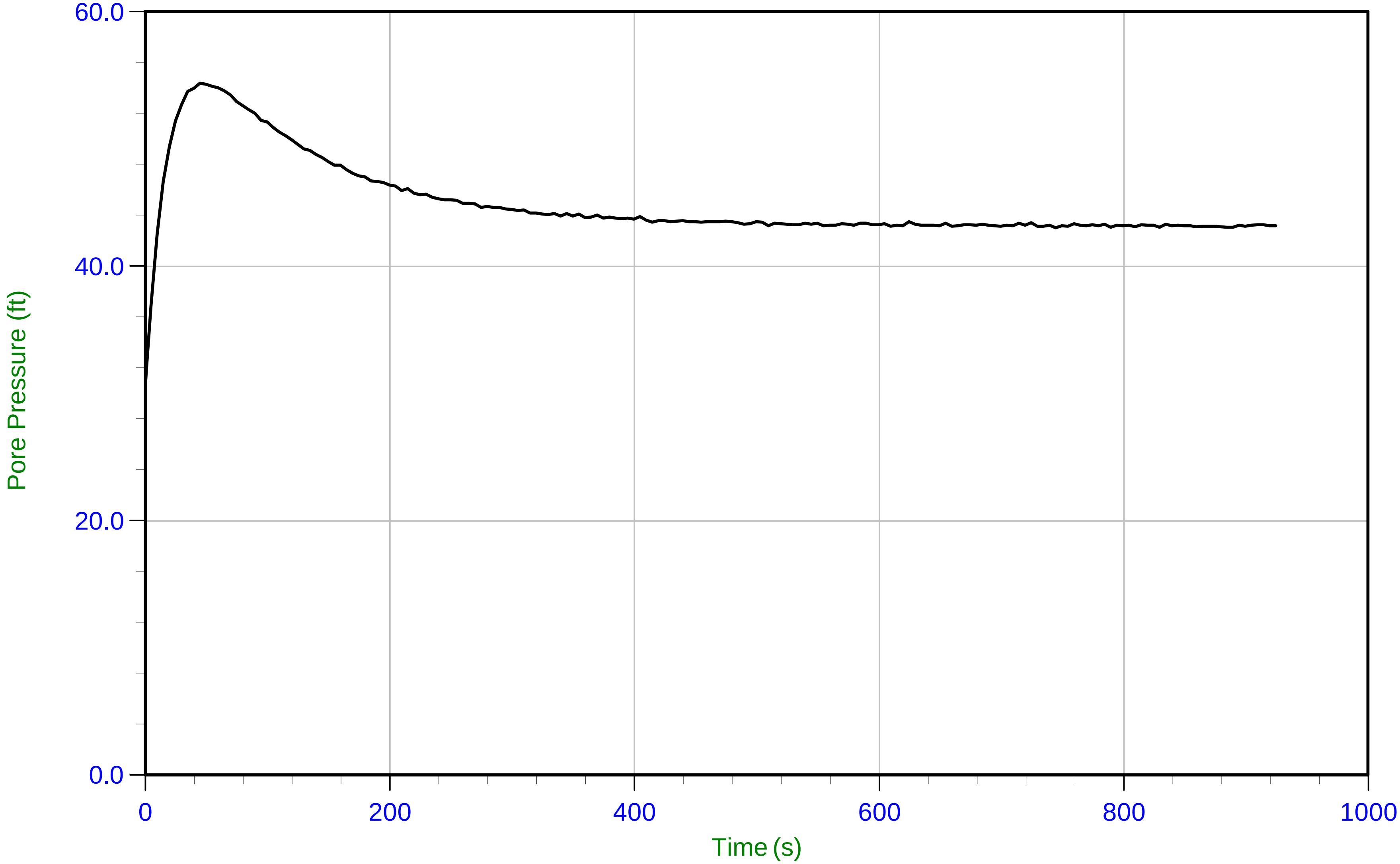
WT: 2.421 m / 7.941 ft
Ueq: 34.5 ft

EHS Support	Job No: 17-53125 Date: 22-Sep-2017 08:30:50 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-14 Cone: AD361 Area=15 cm²



Trace Summary:	Filename: 17-53125_CP14.PPD	U Min: -9.2 ft	WT: 0.978 m / 3.207 ft
	Depth: 13.225 m / 43.389 ft	U Max: 40.2 ft	Ueq: 40.2 ft
	Duration: 1200.0 s		

EHS Support	Job No: 17-53125 Date: 22-Sep-2017 10:28:32 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-15 Cone: AD361 Area=15 cm²



Trace Summary:

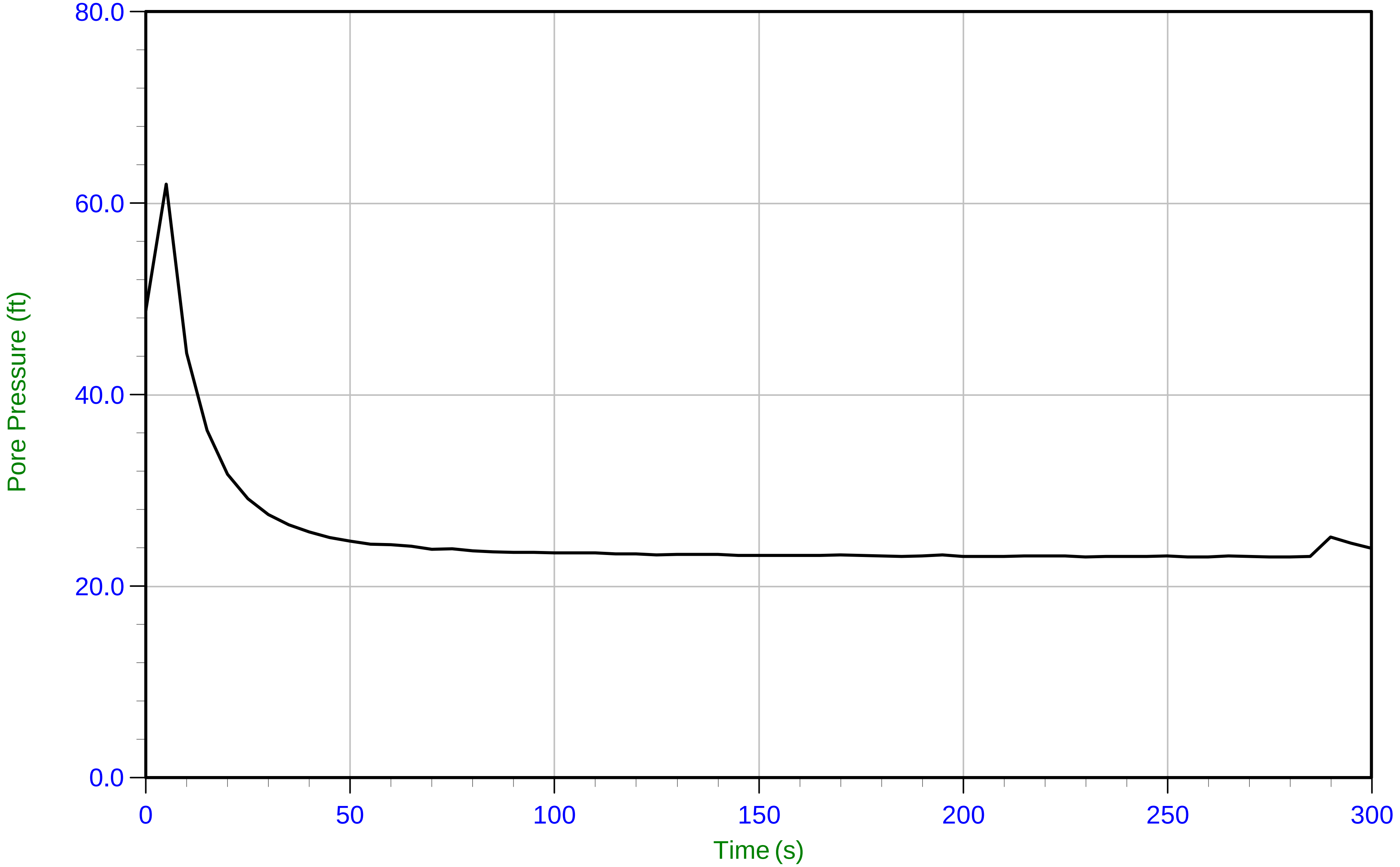
Filename: 17-53125_CP15.PPD	U Min: 30.6 ft	WT: 0.733 m / 2.404 ft
Depth: 13.900 m / 45.603 ft	U Max: 54.4 ft	Ueq: 43.2 ft
Duration: 925.0 s		

ConeTec

EHS Support

Job No: 17-53125
Date: 22-Sep-2017 12:57:00
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-16
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP16.PPD
Depth: 7.775 m / 25.508 ft
Duration: 300.0 s

U Min: 23.1 ft
U Max: 62.0 ft

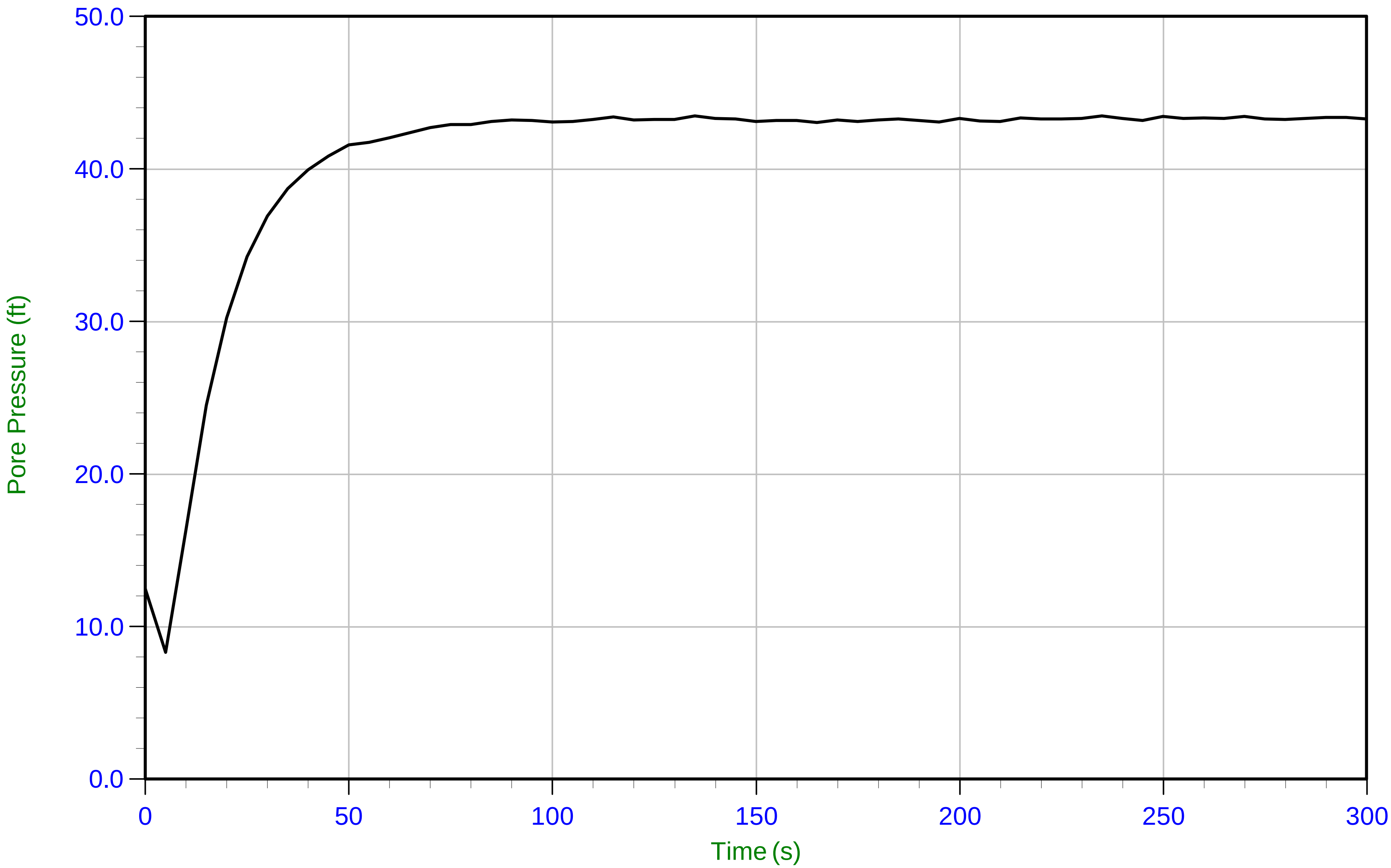
WT: 0.770 m / 2.527 ft
Ueq: 23.0 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 22-Sep-2017 12:57:00
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-16
Cone: AD361 Area=15 cm²



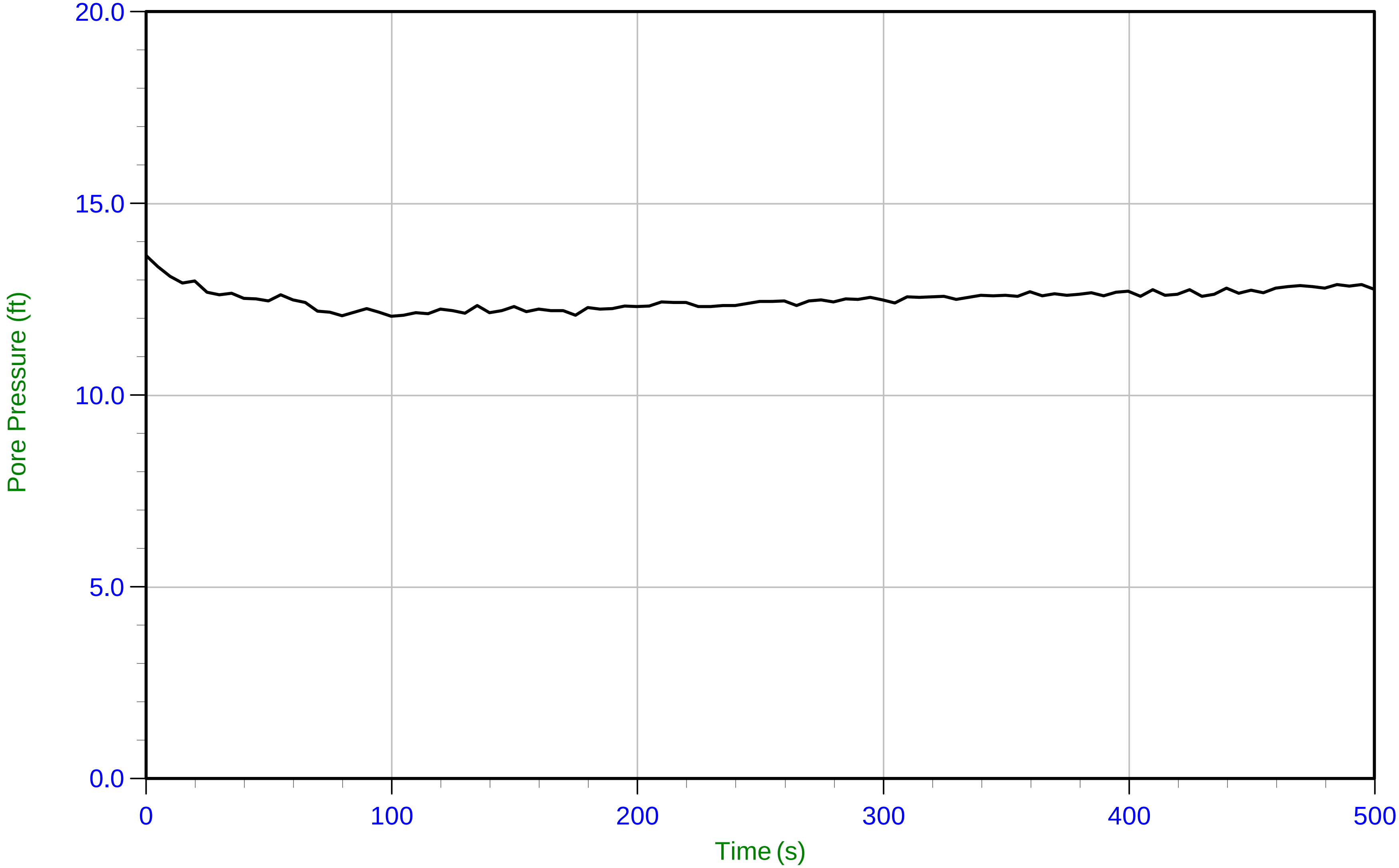
Trace Summary:

Filename: 17-53125_CP16.PPD
Depth: 14.275 m / 46.833 ft
Duration: 300.0 s

U Min: 8.3 ft
U Max: 43.5 ft

WT: 1.030 m / 3.379 ft
Ueq: 43.5 ft

ConeTec	*EHS Support*	Job No: 17-53125 Date: 22-Sep-2017 14:48:15 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-17 Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP17.PPD
Depth: 8.425 m / 27.641 ft
Duration: 500.0 s

U Min: 12.1 ft
U Max: 13.6 ft

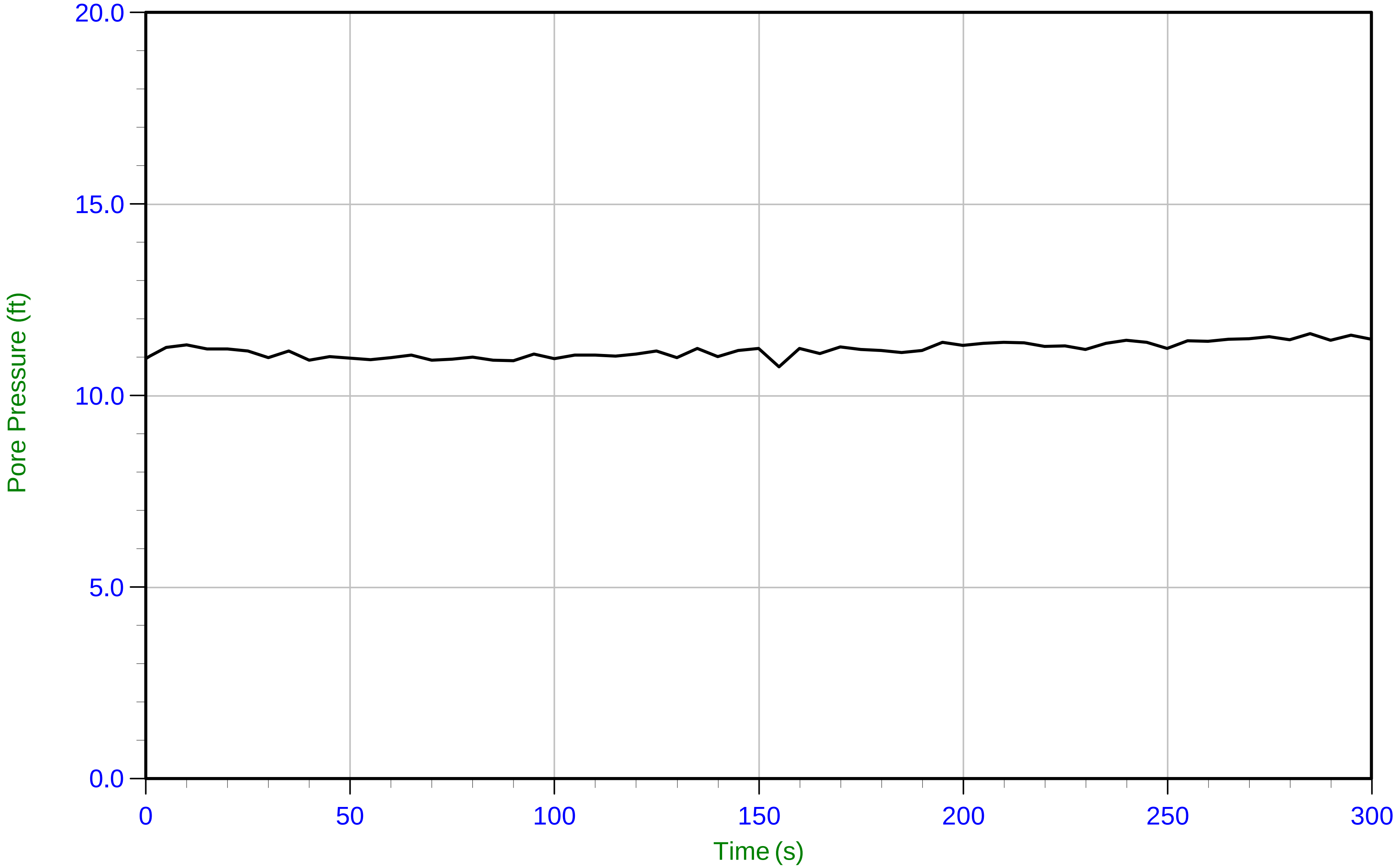
WT: 4.501 m / 14.768 ft
Ueq: 12.9 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 25-Sep-2017 08:28:14
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-18
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP18.PPD
Depth: 6.375 m / 20.915 ft
Duration: 300.0 s

U Min: 10.8 ft
U Max: 11.6 ft

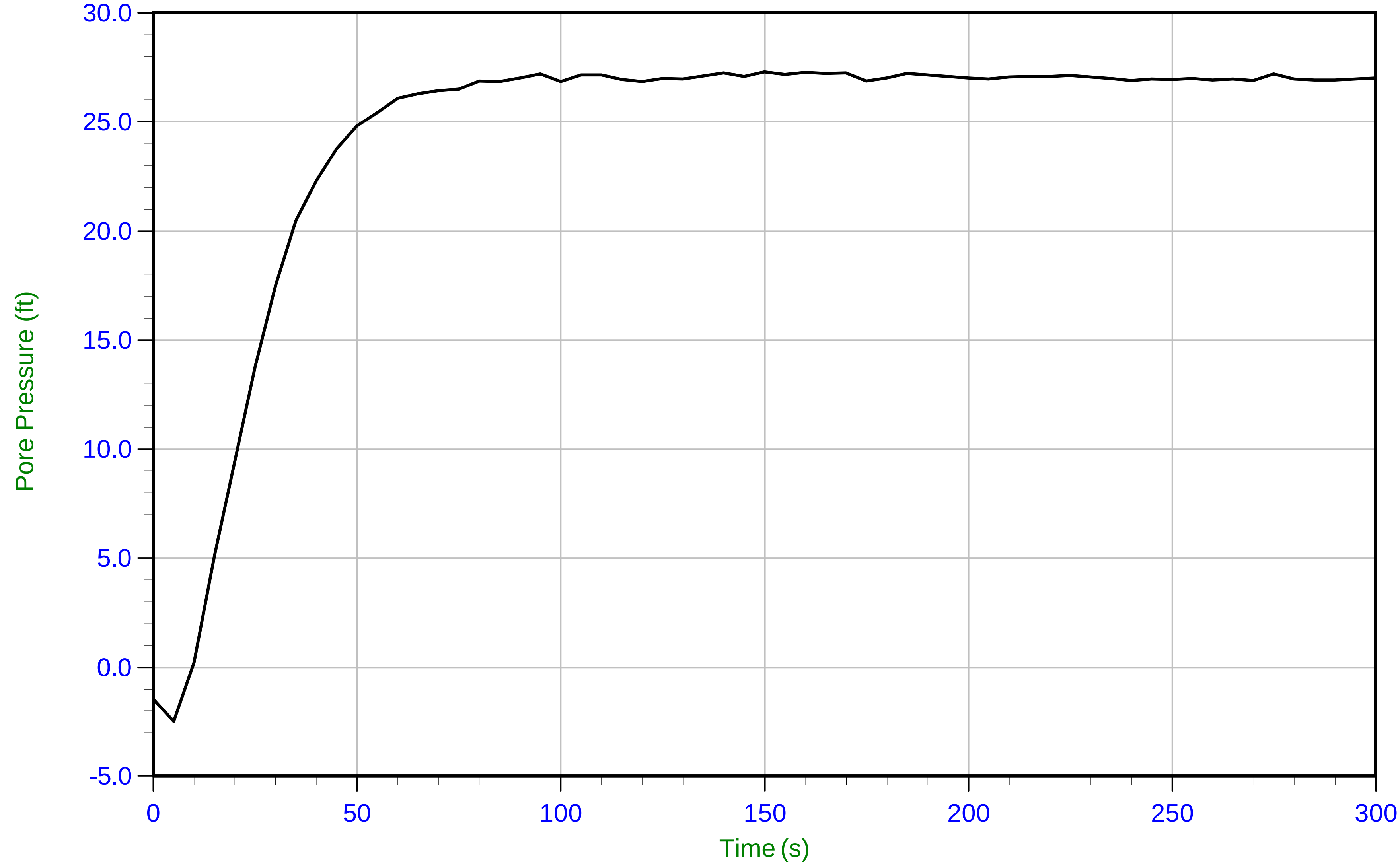
WT: 2.873 m / 9.424 ft
Ueq: 11.5 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 25-Sep-2017 09:42:36
Site: The Paint Company, Gibbsboro, NJ

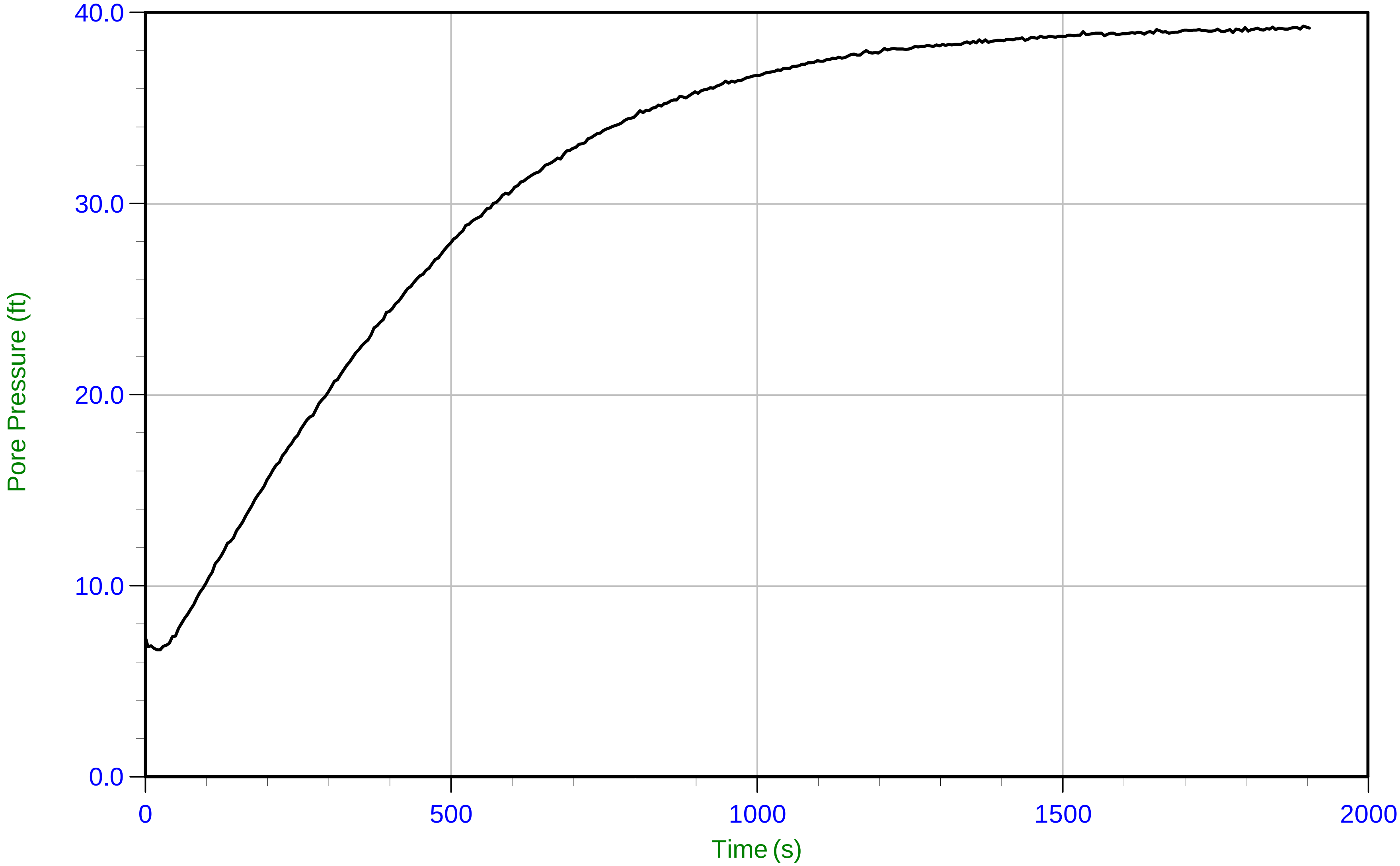
Sounding: CPT/MIP17-19
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP19.PPD	U Min: -2.5 ft	WT: 0.812 m / 2.664 ft
Depth: 9.025 m / 29.609 ft	U Max: 27.3 ft	Ueq: 26.9 ft
Duration: 300.0 s		

EHS Support	Job No: 17-53125 Date: 25-Sep-2017 09:42:36 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-19 Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP19.PPD
Depth: 13.025 m / 42.732 ft
Duration: 1905.0 s

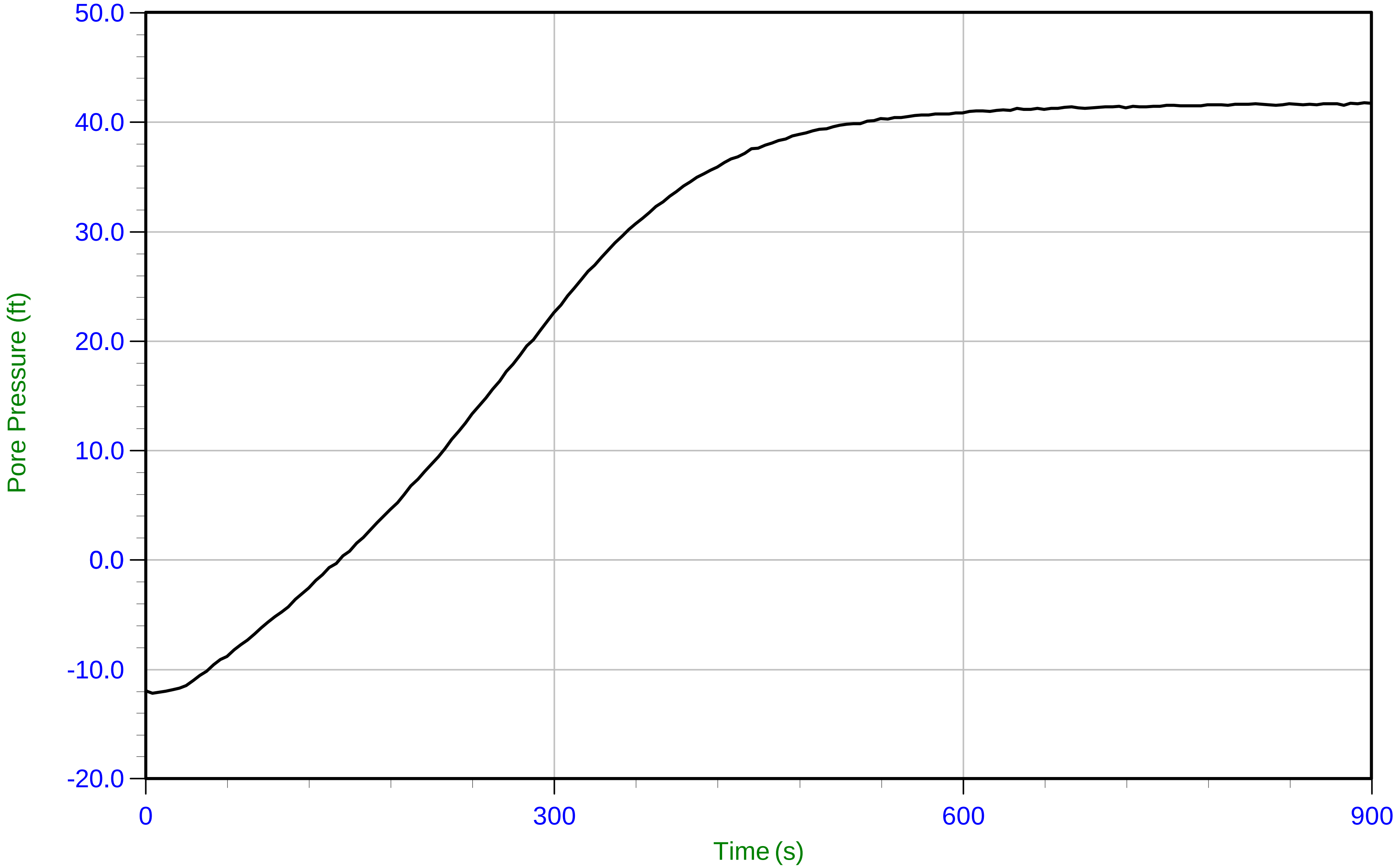
U Min: 6.7 ft
U Max: 39.3 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 25-Sep-2017 12:29:53
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-20
Cone: AD361 Area=15 cm²



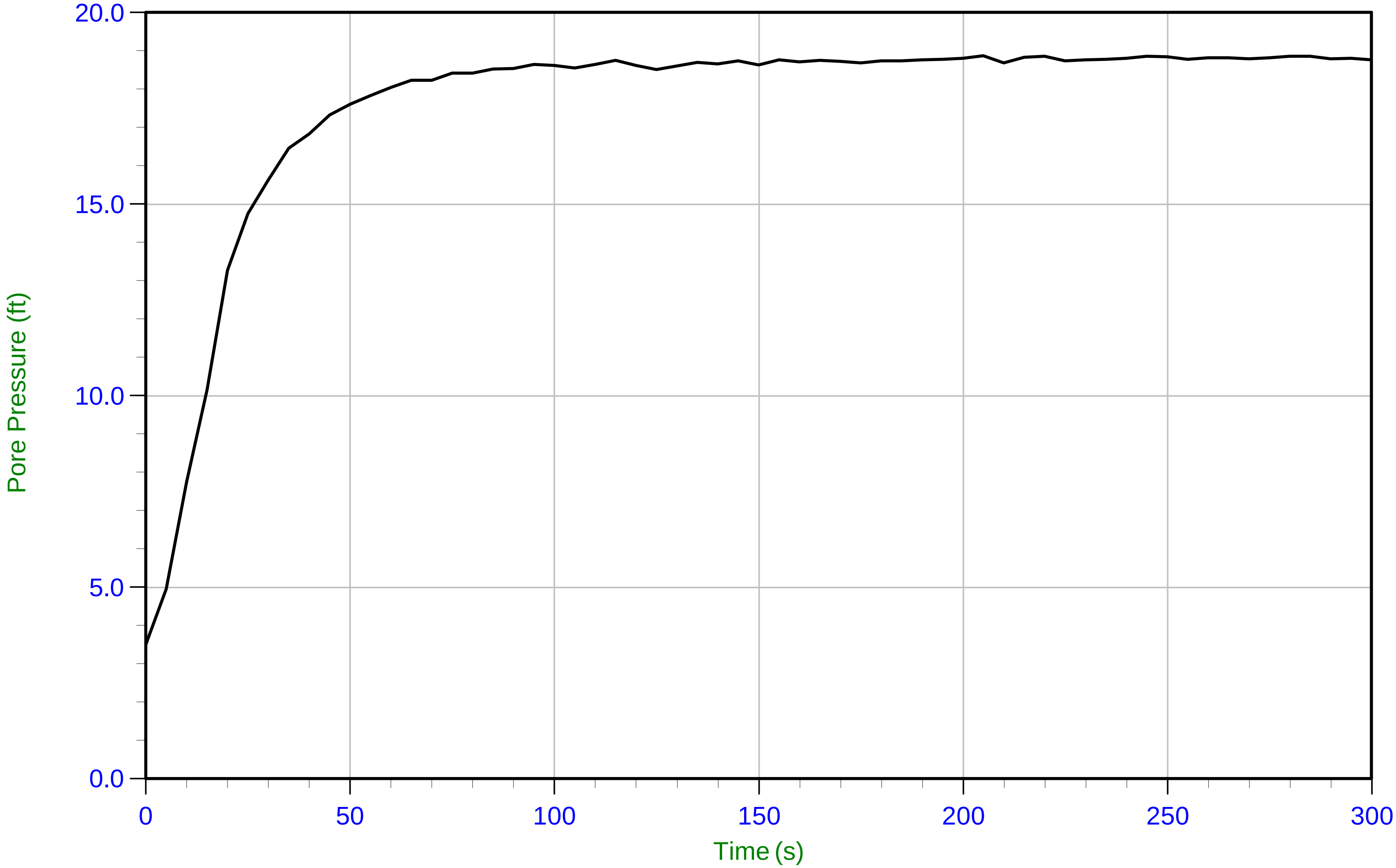
Trace Summary:

Filename: 17-53125_CP20.PPD
Depth: 13.850 m / 45.439 ft
Duration: 900.0 s

U Min: -12.2 ft
U Max: 41.8 ft

WT: 1.170 m / 3.840 ft
Ueq: 41.6 ft

CONETEC		
EHS Support	Job No: 17-53125 Date: 25-Sep-2017 14:29:23 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-21 Cone: AD361 Area=15 cm²



Trace Summary:

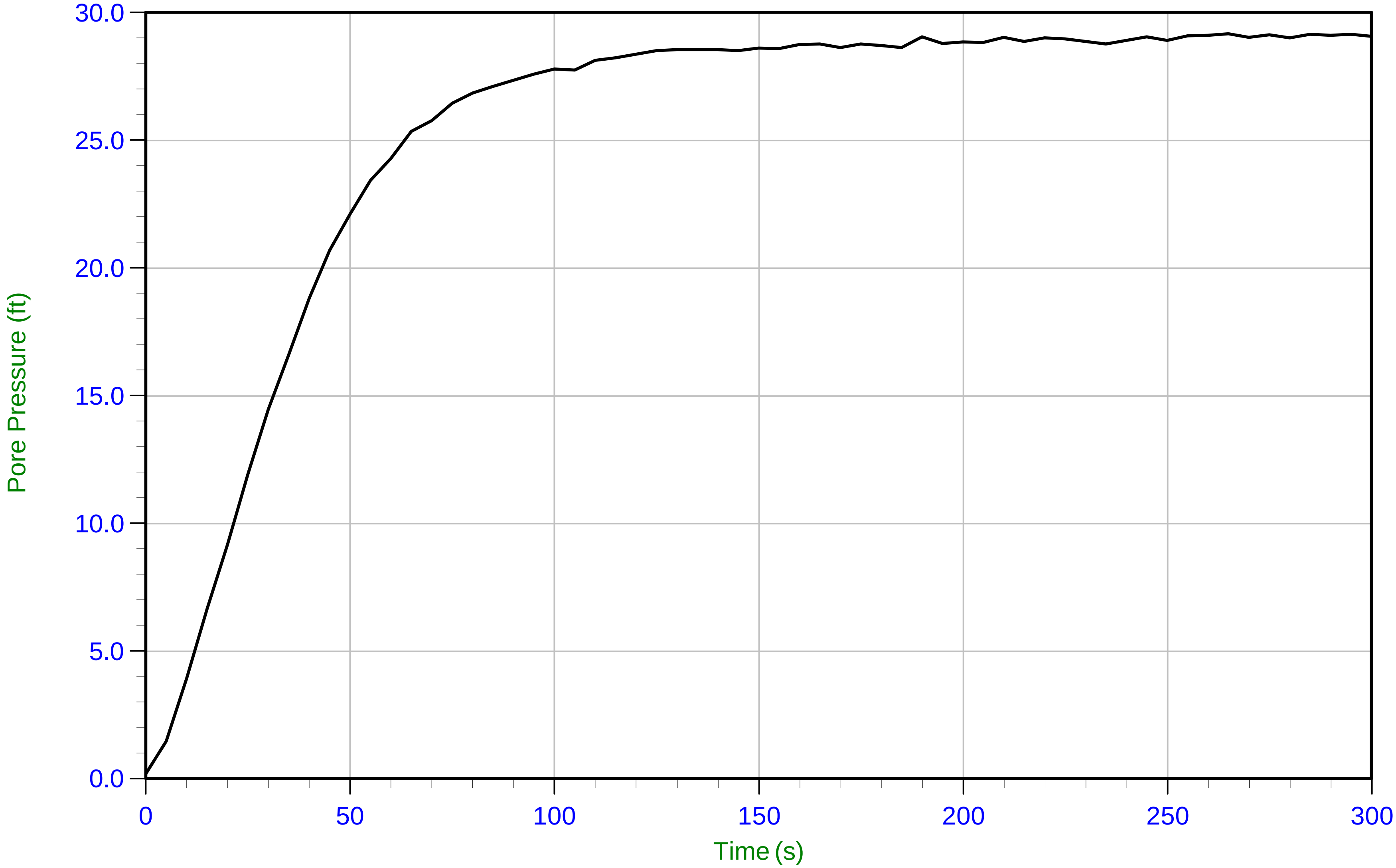
Filename: 17-53125_CP21.PPD	U Min: 3.5 ft	WT: 0.859 m / 2.817 ft
Depth: 6.600 m / 21.653 ft	U Max: 18.9 ft	Ueq: 18.8 ft
Duration: 300.0 s		

ConeTec

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 08:51:10
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-22
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP22.PPD
Depth: 13.000 m / 42.650 ft
Duration: 300.0 s

U Min: 0.2 ft
U Max: 29.2 ft

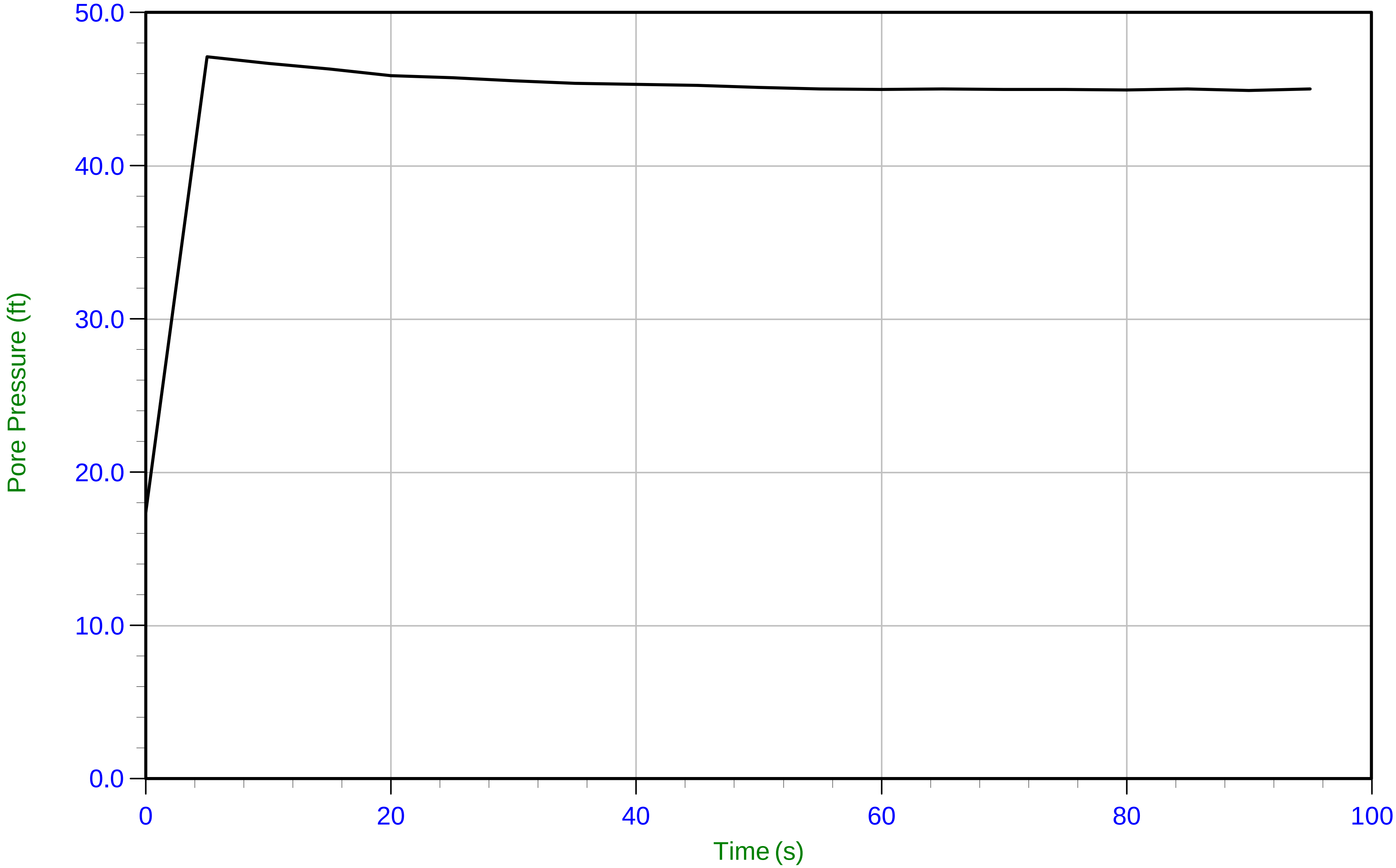
WT: 4.122 m / 13.523 ft
Ueq: 29.1 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 10:46:13
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-23
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP23.PPD
Depth: 14.775 m / 48.474 ft
Duration: 95.0 s

U Min: 17.4 ft
U Max: 47.1 ft

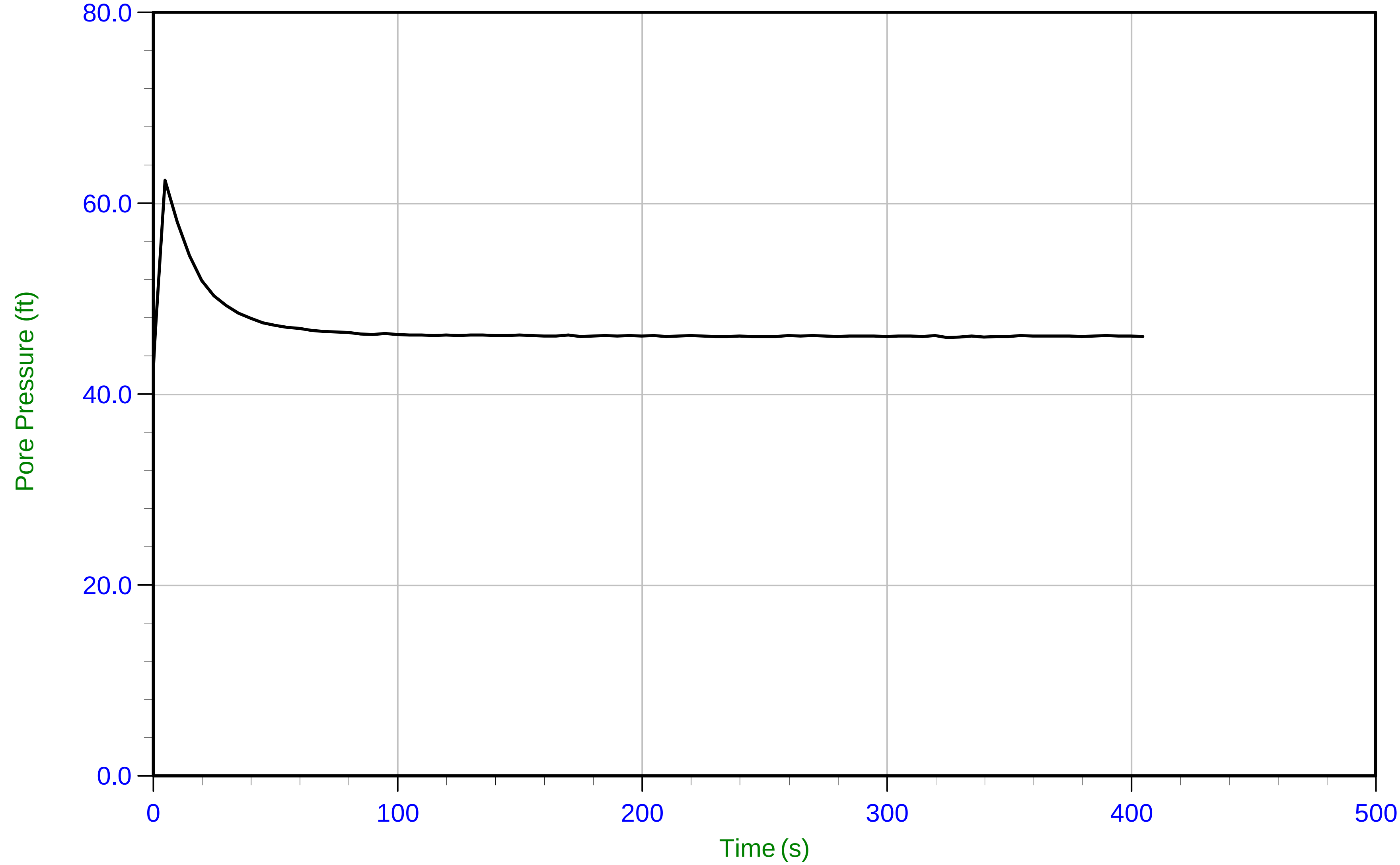
WT: 1.087 m / 3.565 ft
Ueq: 44.9 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 10:46:13
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-23
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP23.PPD
Depth: 15.075 m / 49.458 ft
Duration: 405.0 s

U Min: 42.6 ft
U Max: 62.5 ft

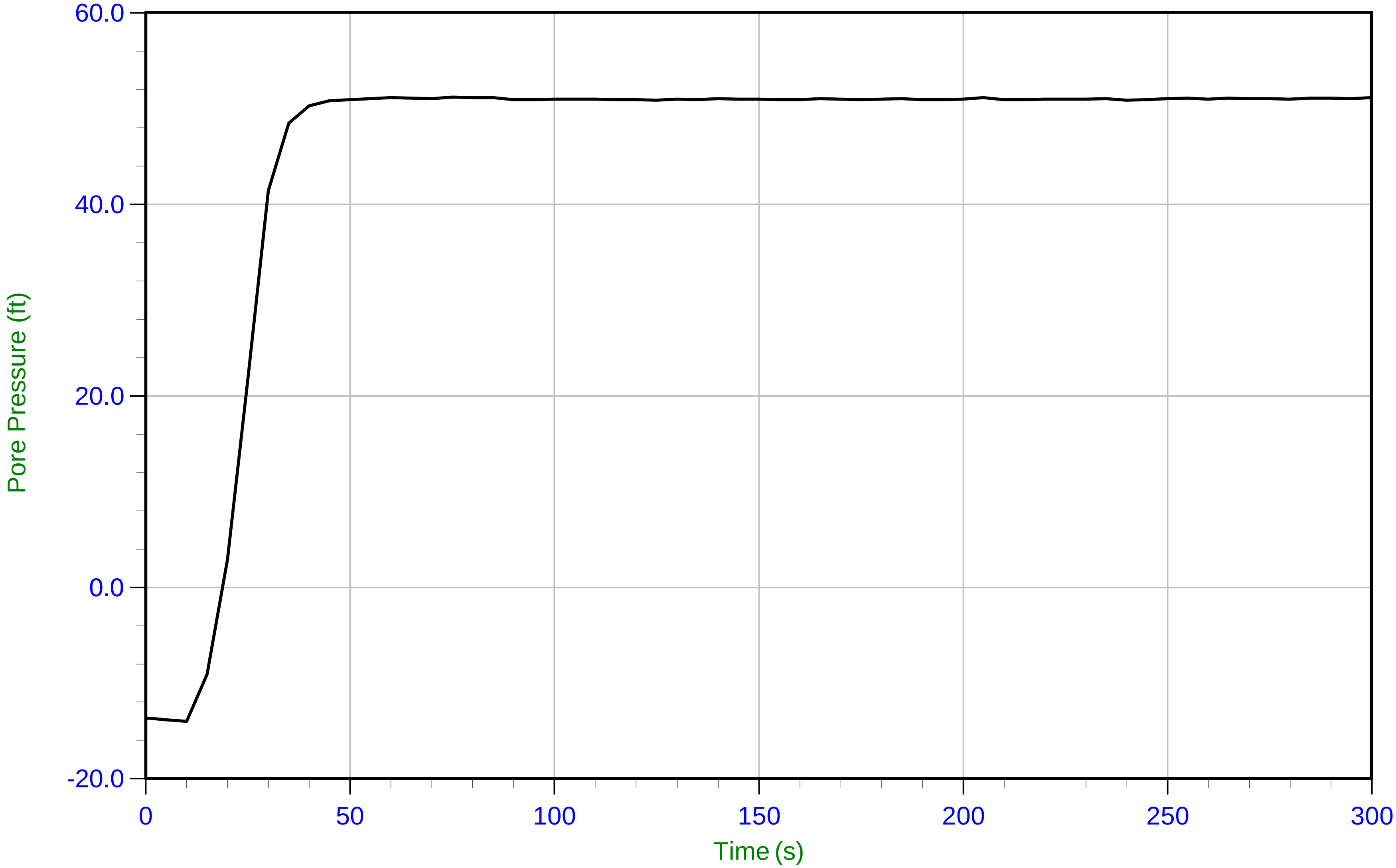
WT: 0.977 m / 3.204 ft
Ueq: 46.3 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 10:46:13
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-23
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP23.PPD
Depth: 16.600 m / 54.461 ft
Duration: 300.0 s

U Min: -14.0 ft
U Max: 51.2 ft

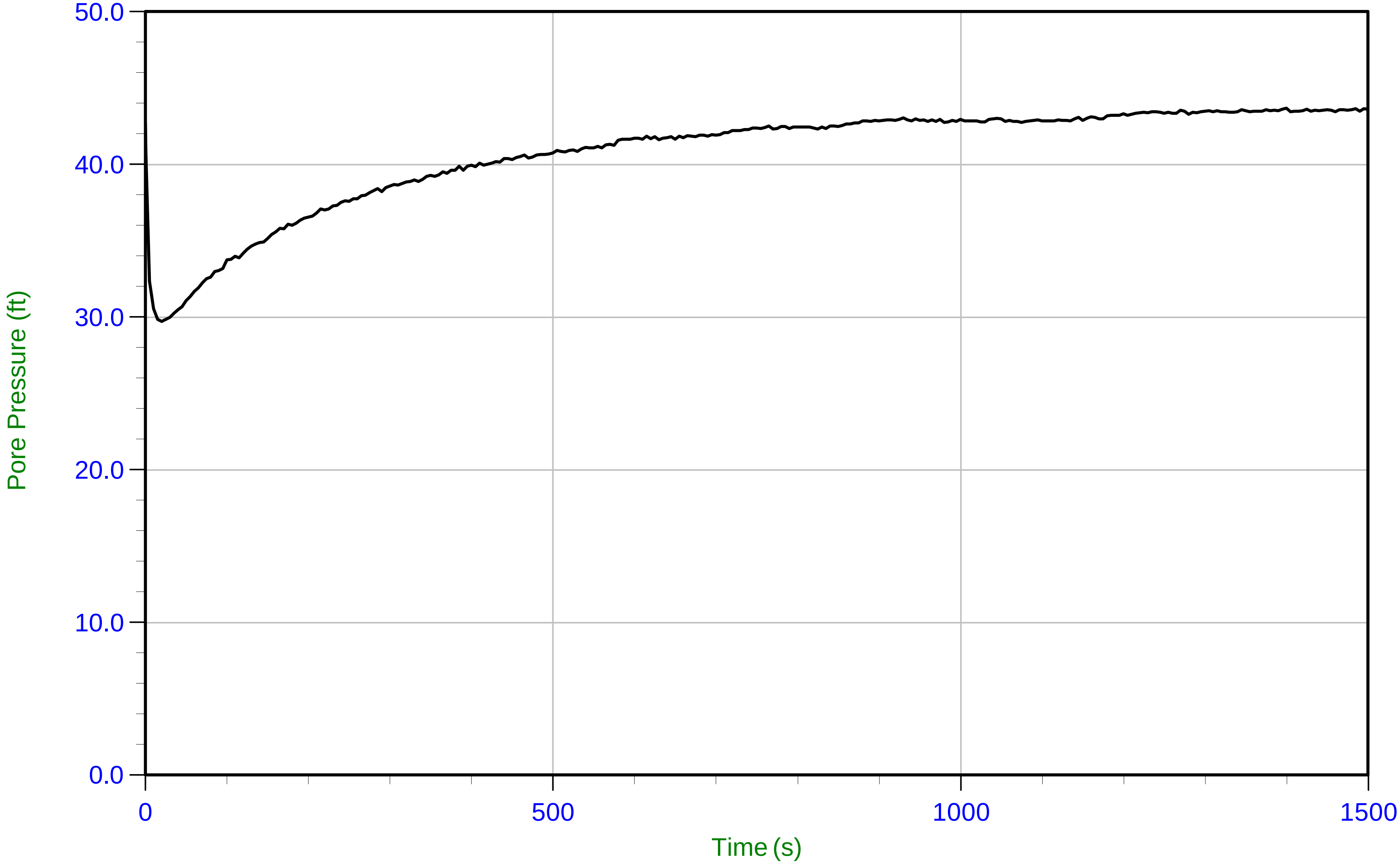
WT: 1.061 m / 3.480 ft
Ueq: 51.0 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 13:15:11
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-24
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP24.PPD
Depth: 14.525 m / 47.654 ft
Duration: 1500.0 s

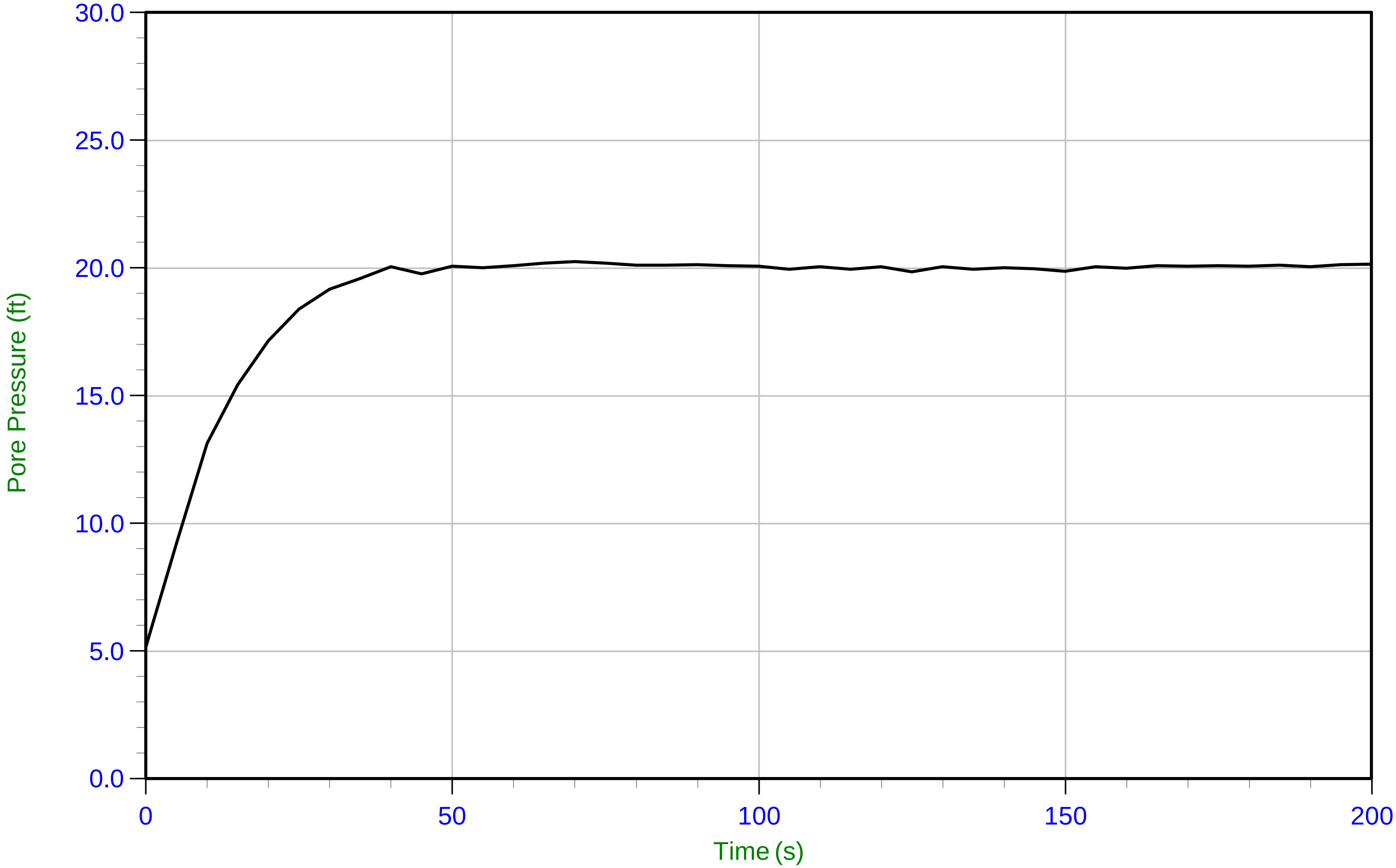
U Min: 29.7 ft
U Max: 43.7 ft

WT: 1.280 m / 4.200 ft
Ueq: 43.5 ft

EHS Support

Job No: 17-53125
Date: 26-Sep-2017 15:21:55
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-25
Cone: AD361 Area=15 cm²

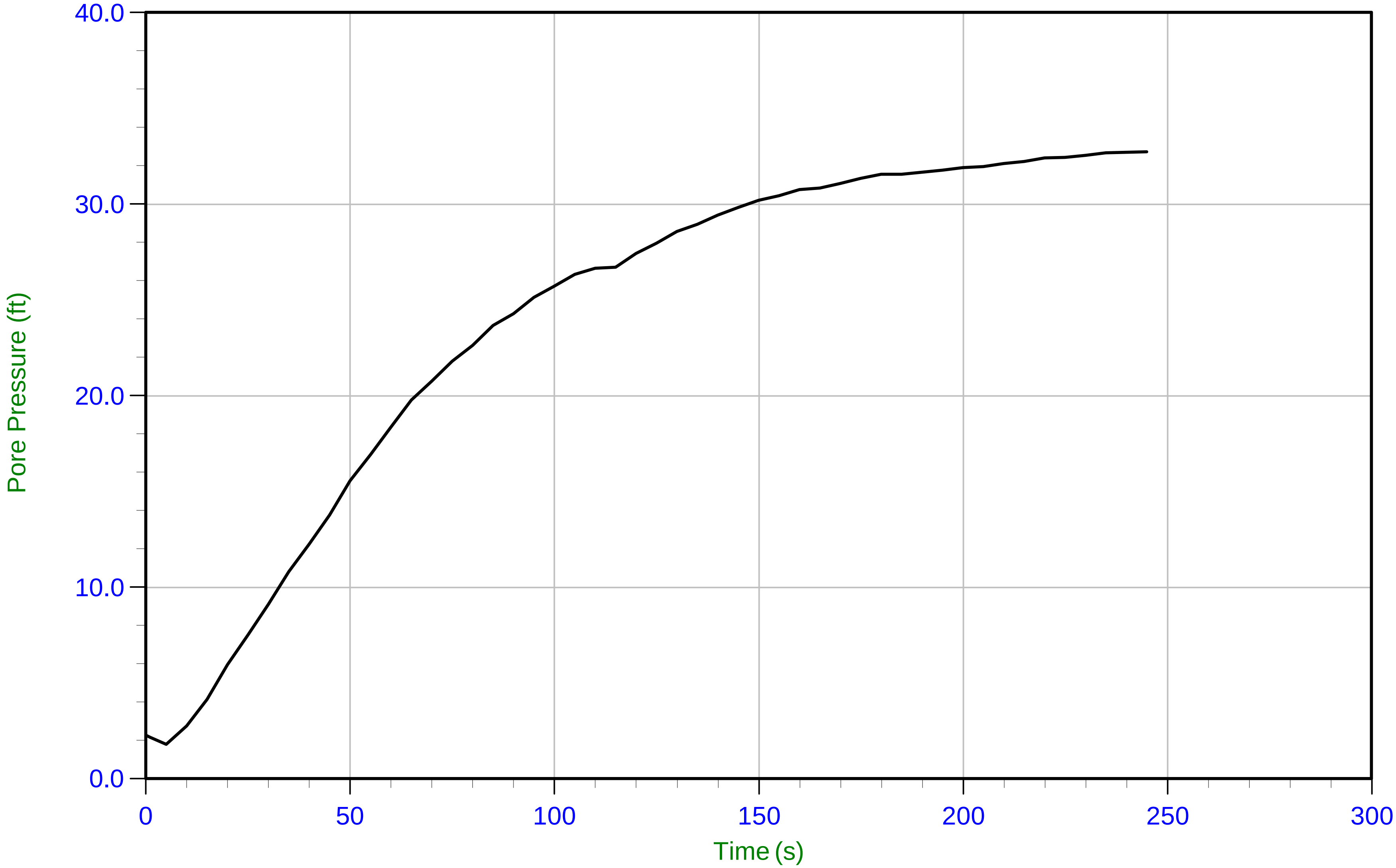


Trace Summary:

Filename: 17-53125_CP25.PPD
Depth: 9.950 m / 32.644 ft
Duration: 200.0 s

U Min: 5.2 ft
U Max: 20.2 ft

WT: 3.865 m / 12.681 ft
Ueq: 20.0 ft



Trace Summary:

Filename: 17-53125_CP25.PPD
Depth: 12.975 m / 42.568 ft
Duration: 245.0 s

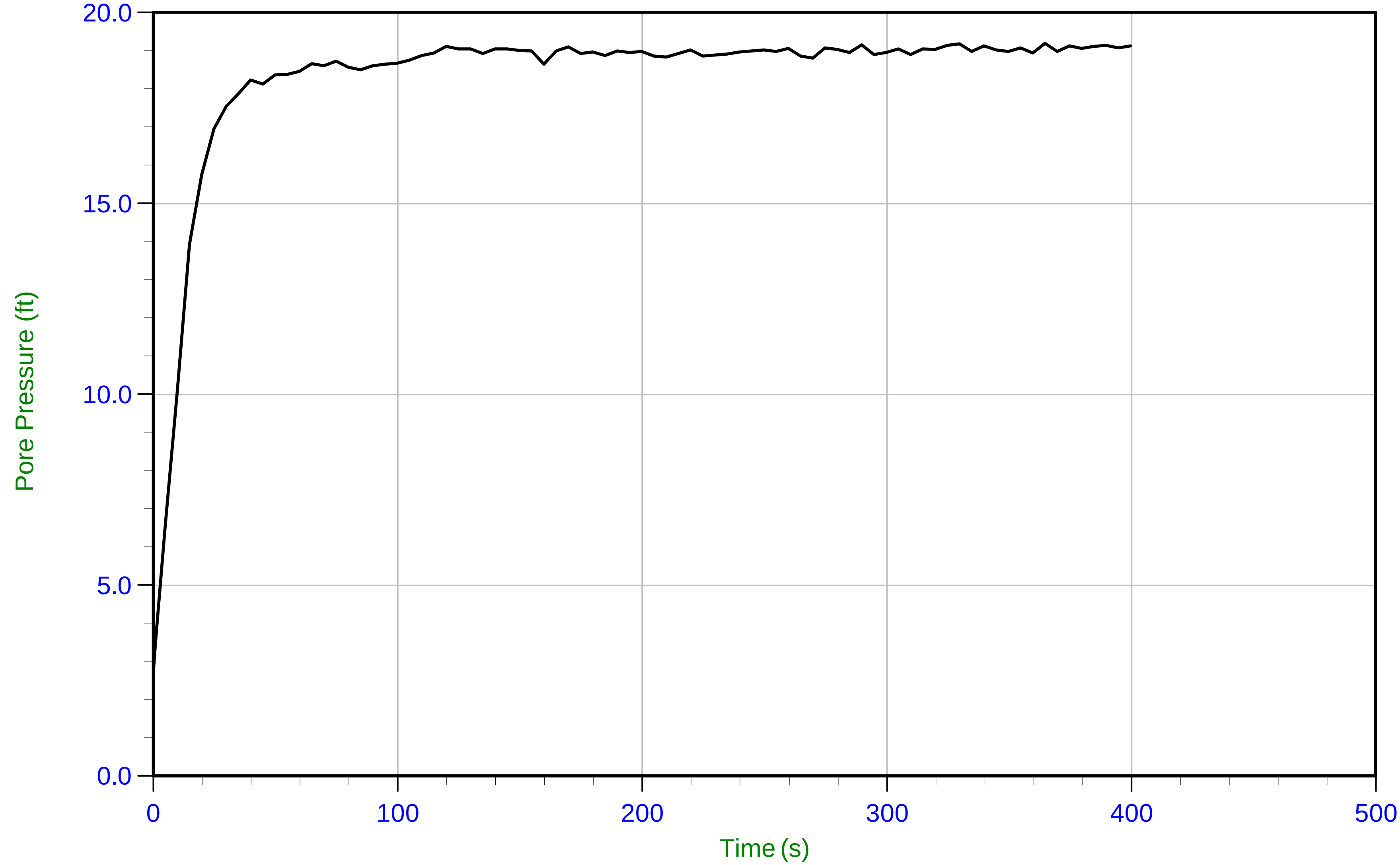
U Min: 1.8 ft
U Max: 32.7 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 27-Sep-2017 08:40:04
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-26
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP26.PPD
Depth: 9.650 m / 31.660 ft
Duration: 400.0 s

U Min: 2.7 ft
U Max: 19.2 ft

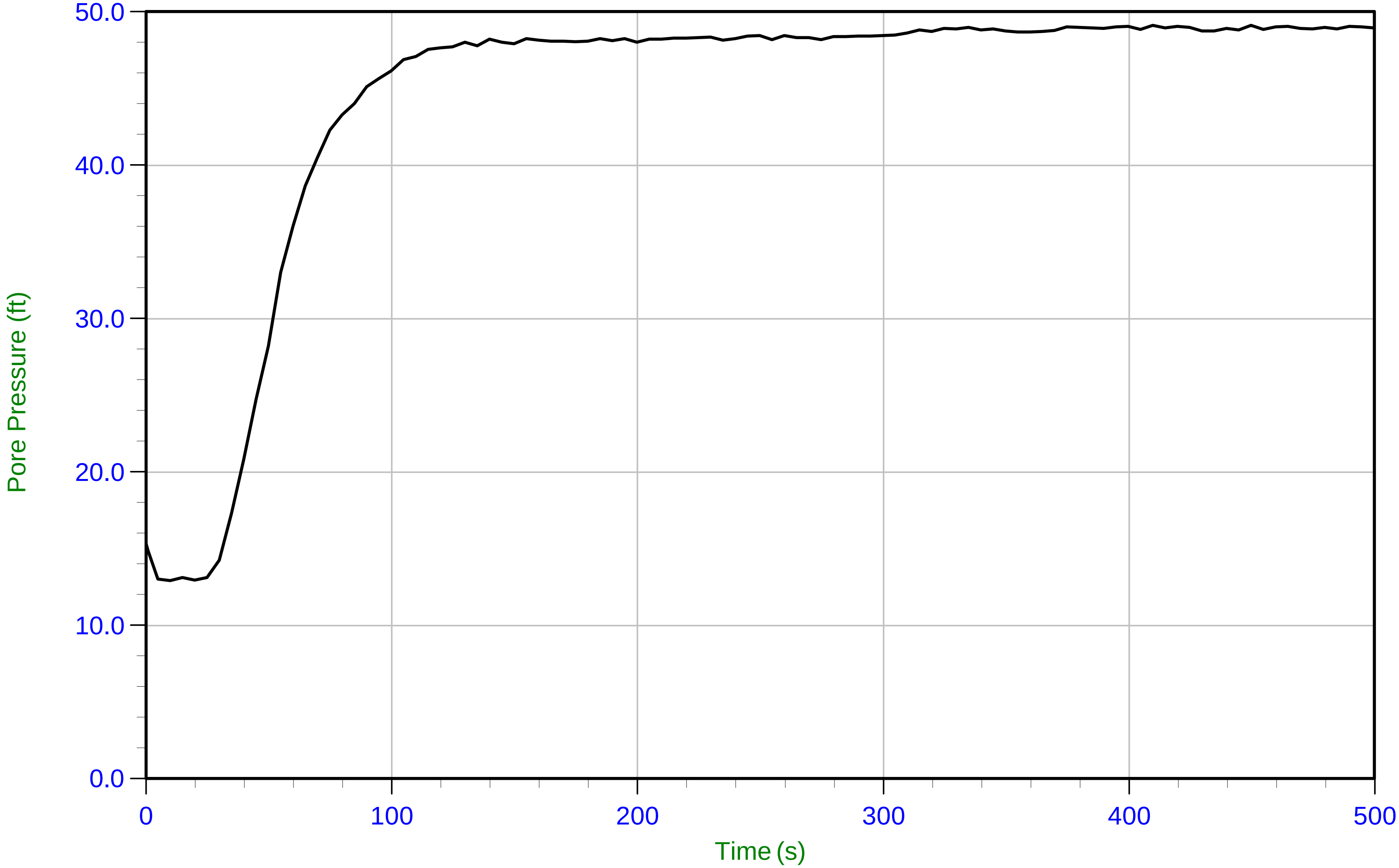
WT: 3.842 m / 12.605 ft
Ueq: 19.1 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 27-Sep-2017 08:40:04
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-26
Cone: AD361 Area=15 cm²



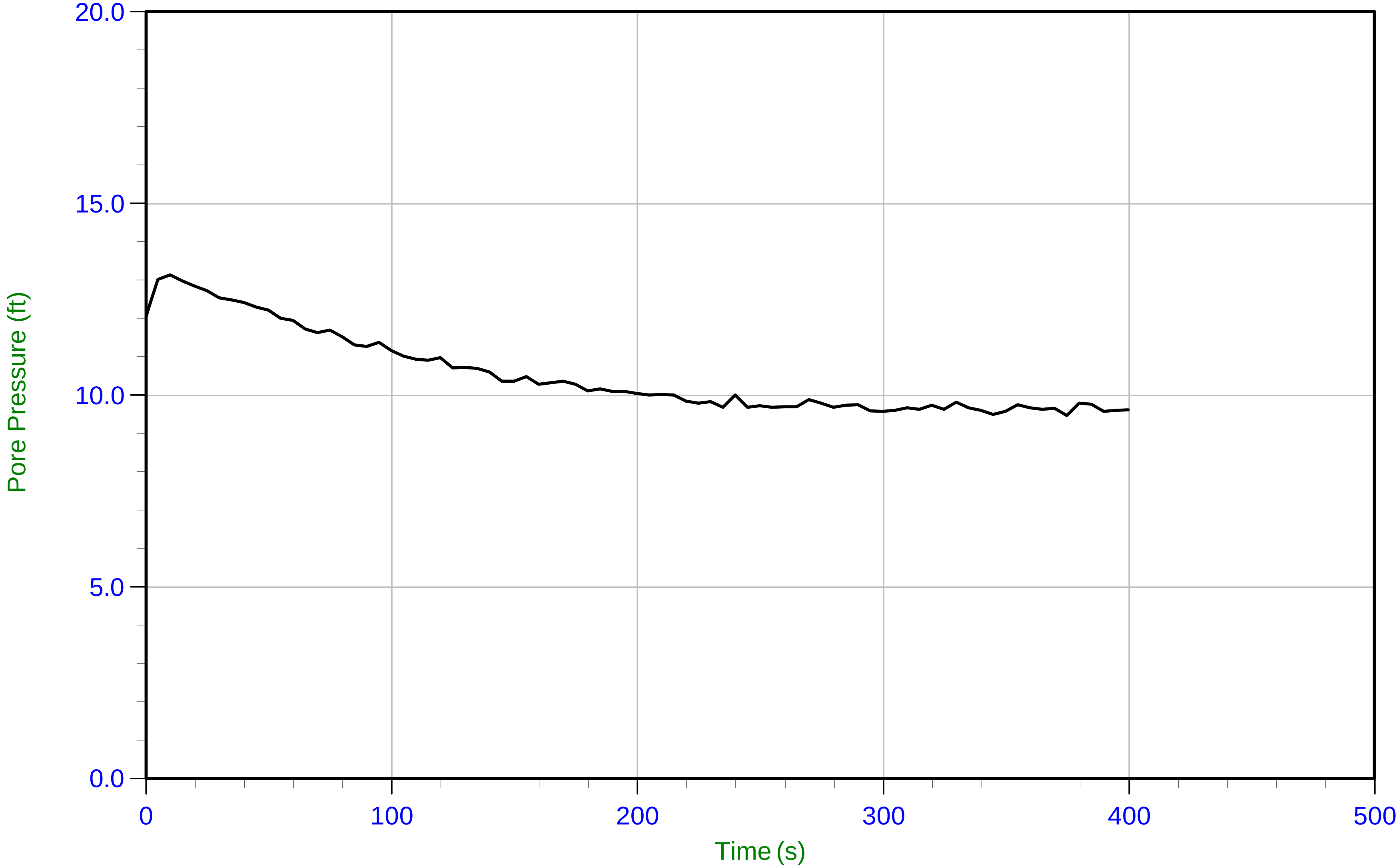
Trace Summary:

Filename: 17-53125_CP26.PPD
Depth: 19.200 m / 62.991 ft
Duration: 500.0 s

U Min: 12.9 ft
U Max: 49.1 ft

WT: 4.237 m / 13.901 ft
Ueq: 49.1 ft

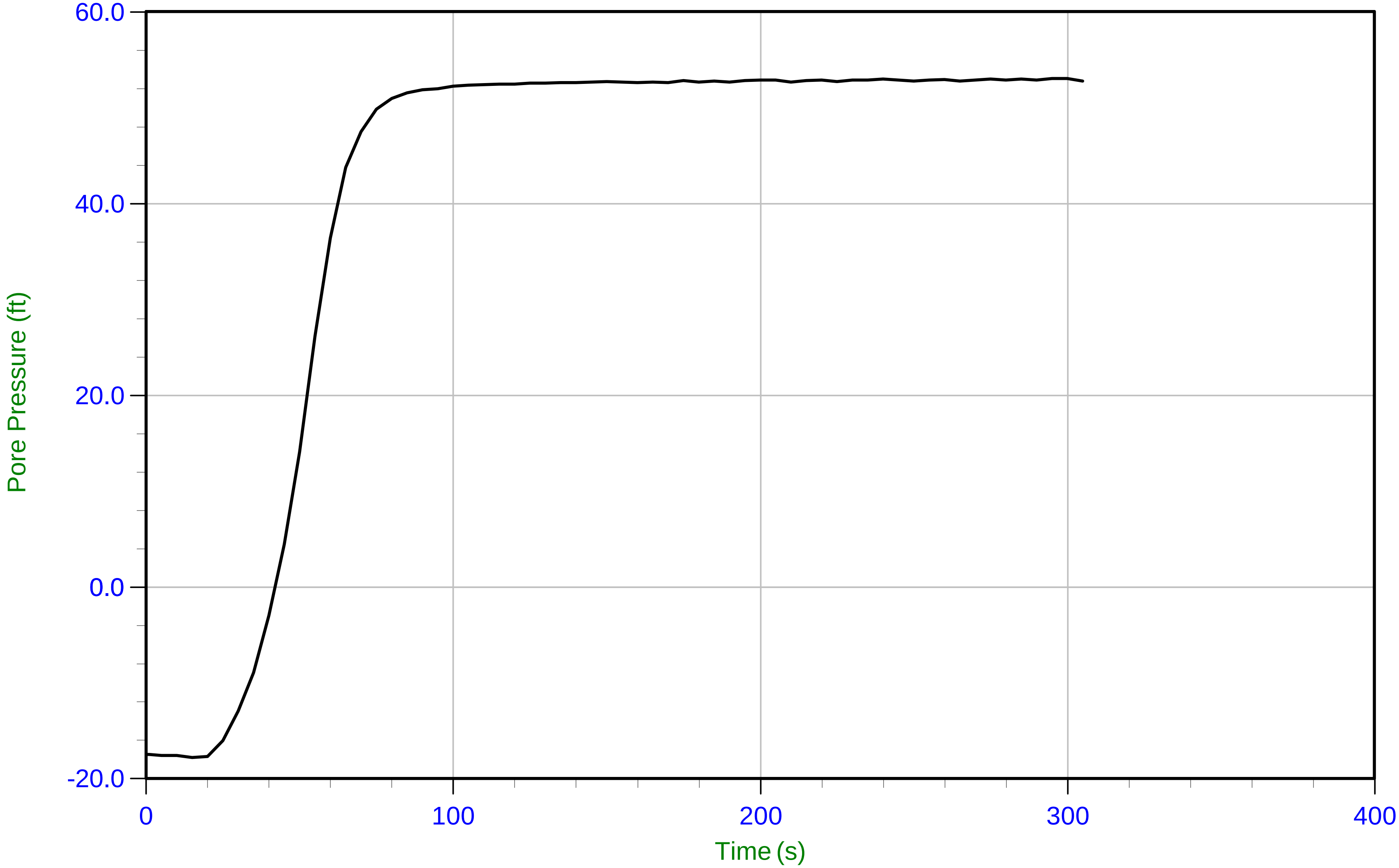
EHS Support	Job No: 17-53125	Sounding: CPT/MIP17-27
	Date: 27-Sep-2017 10:50:43	Cone: AD361 Area=15 cm²
	Site: The Paint Company, Gibbsboro, NJ	



Trace Summary:

Filename: 17-53125_CP27.PPD	U Min: 9.5 ft	WT: 4.024 m / 13.202 ft
Depth: 6.950 m / 22.802 ft	U Max: 13.1 ft	Ueq: 9.6 ft
Duration: 400.0 s		

EHS Support	Job No: 17-53125 Date: 27-Sep-2017 10:50:43 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-27 Cone: AD361 Area=15 cm²



Trace Summary:

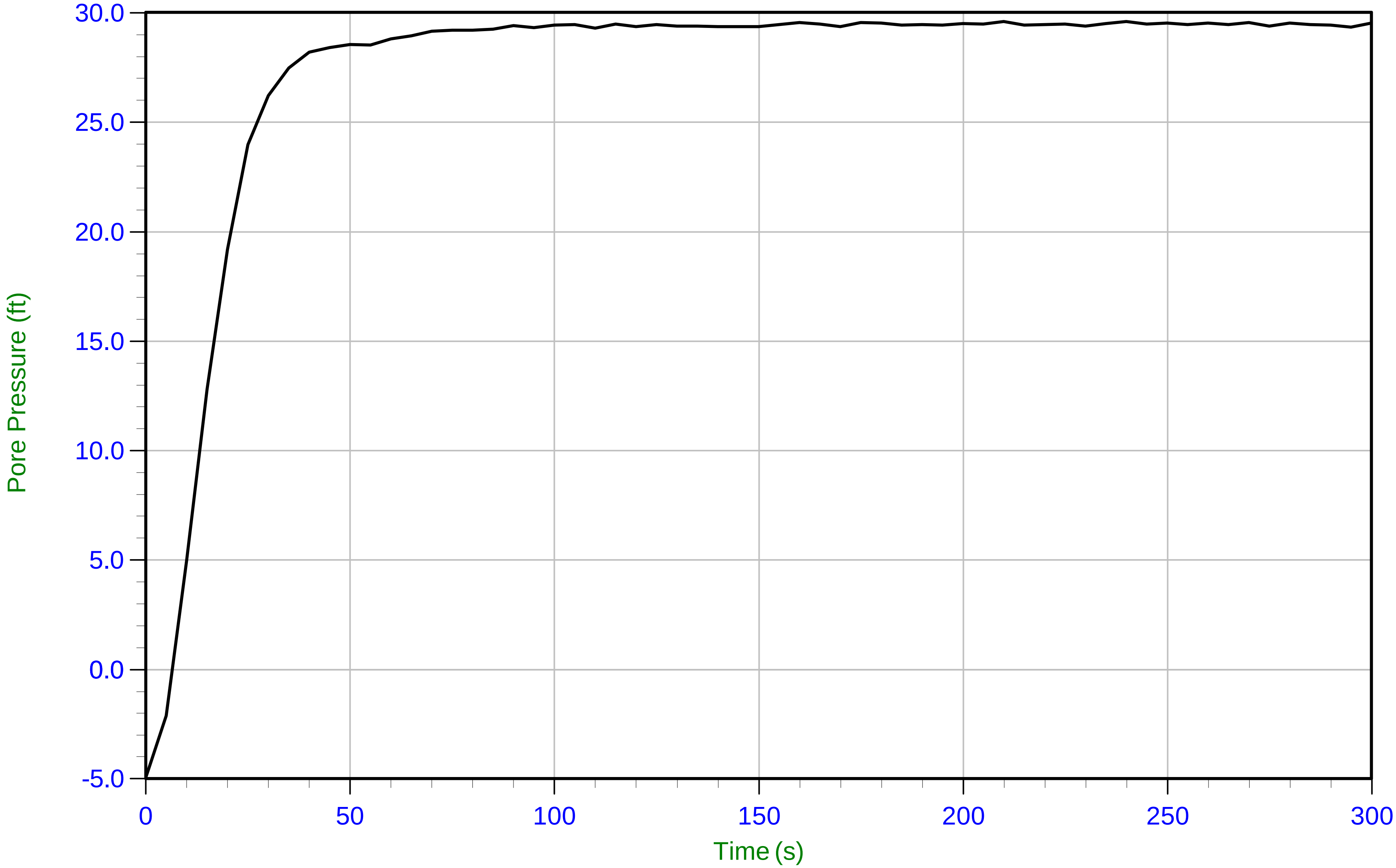
Filename: 17-53125_CP27.PPD	U Min: -17.8 ft	WT: 3.990 m / 13.091 ft
Depth: 20.150 m / 66.108 ft	U Max: 53.1 ft	Ueq: 53.0 ft
Duration: 305.0 s		

CONETEC

EHS Support

Job No: 17-53125
Date: 27-Sep-2017 13:27:35
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-28
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP28.PPD
Depth: 12.900 m / 42.322 ft
Duration: 300.0 s

U Min: -4.9 ft
U Max: 29.6 ft

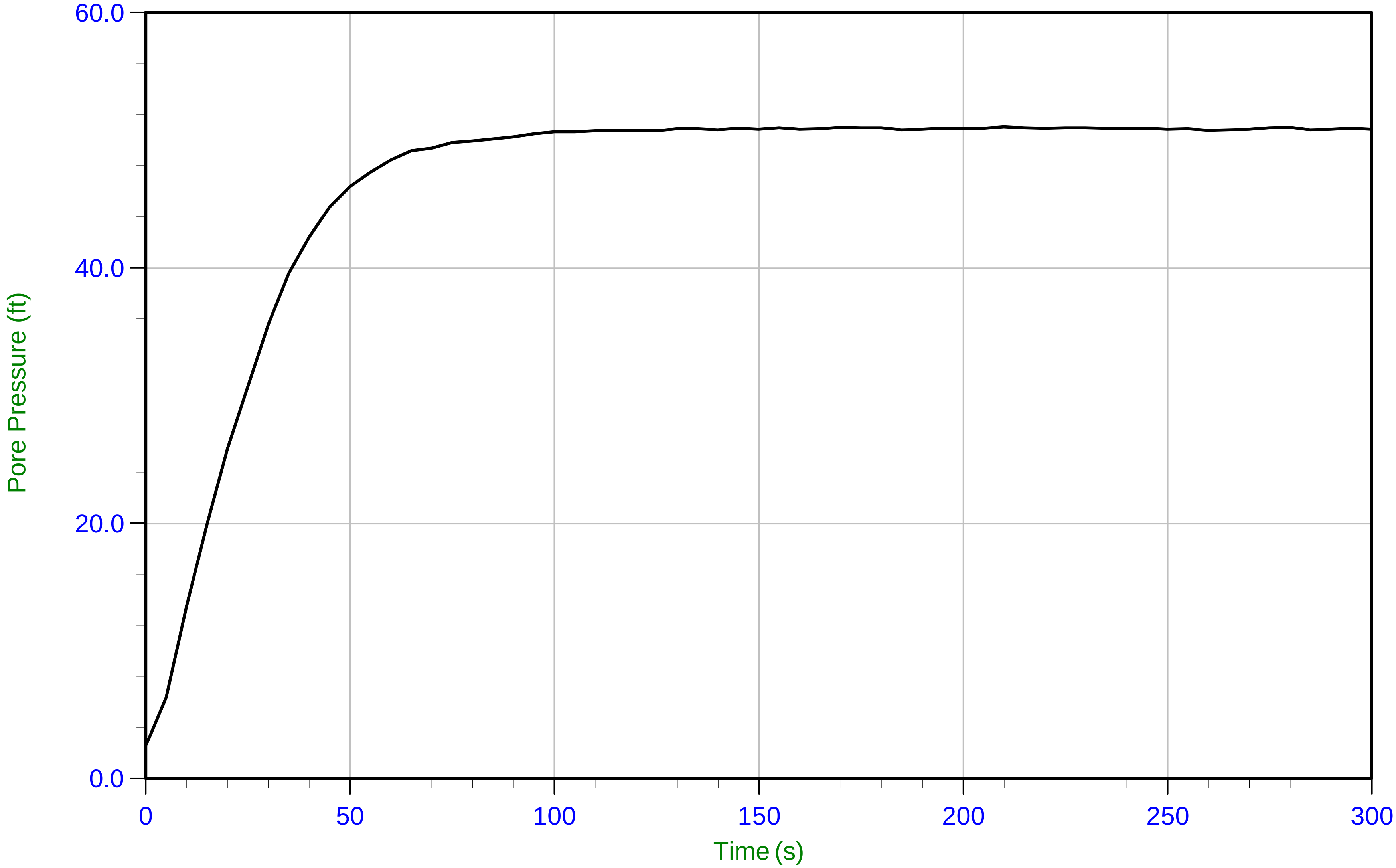
WT: 3.950 m / 12.959 ft
Ueq: 29.4 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 27-Sep-2017 13:27:35
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-28
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP28.PPD
Depth: 19.625 m / 64.386 ft
Duration: 300.0 s

U Min: 2.6 ft
U Max: 51.0 ft

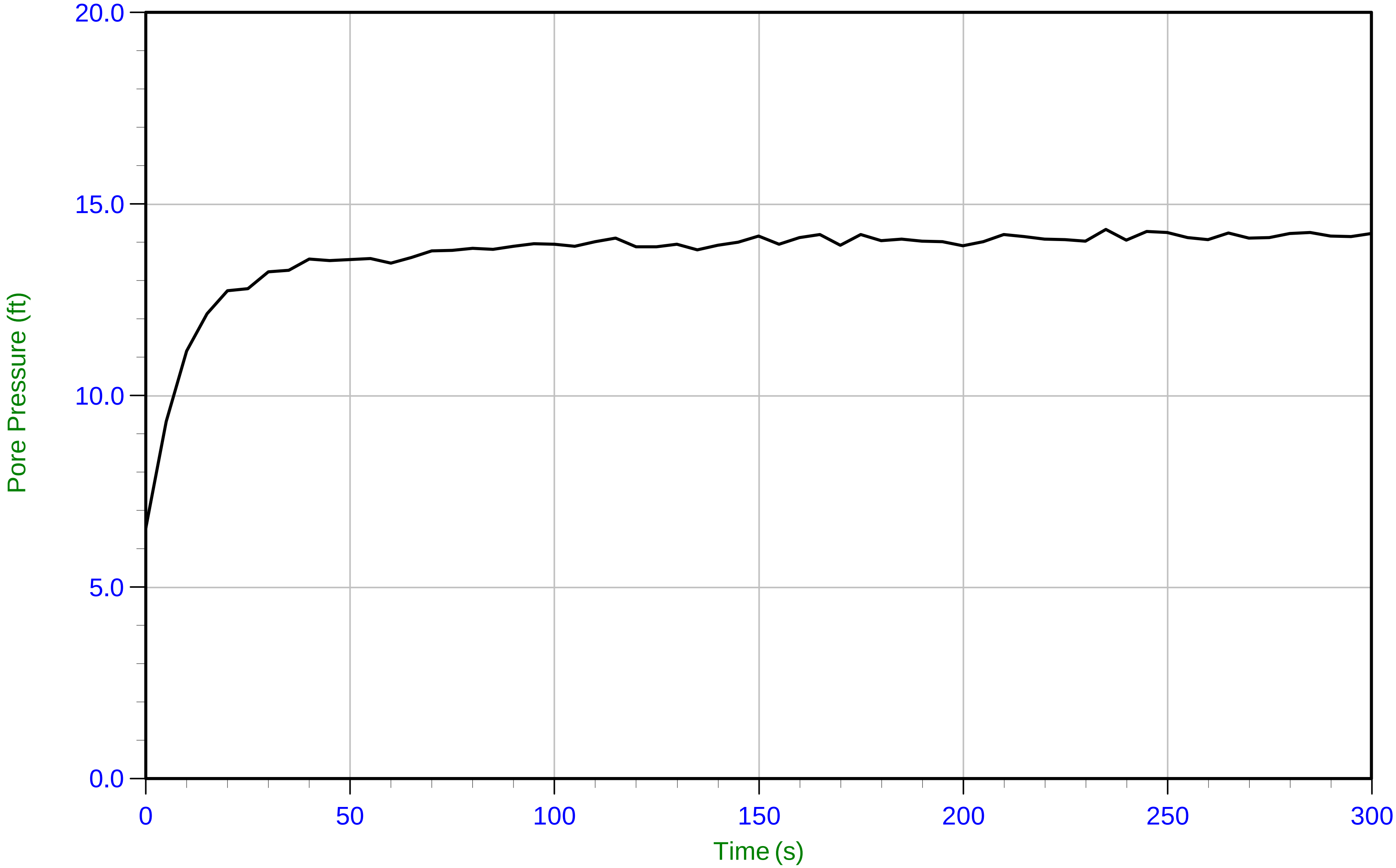
WT: 4.064 m / 13.332 ft
Ueq: 51.1 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 28-Sep-2017 08:42:15
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-29
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP29.PPD
Depth: 9.575 m / 31.414 ft
Duration: 300.0 s

U Min: 6.5 ft
U Max: 14.3 ft

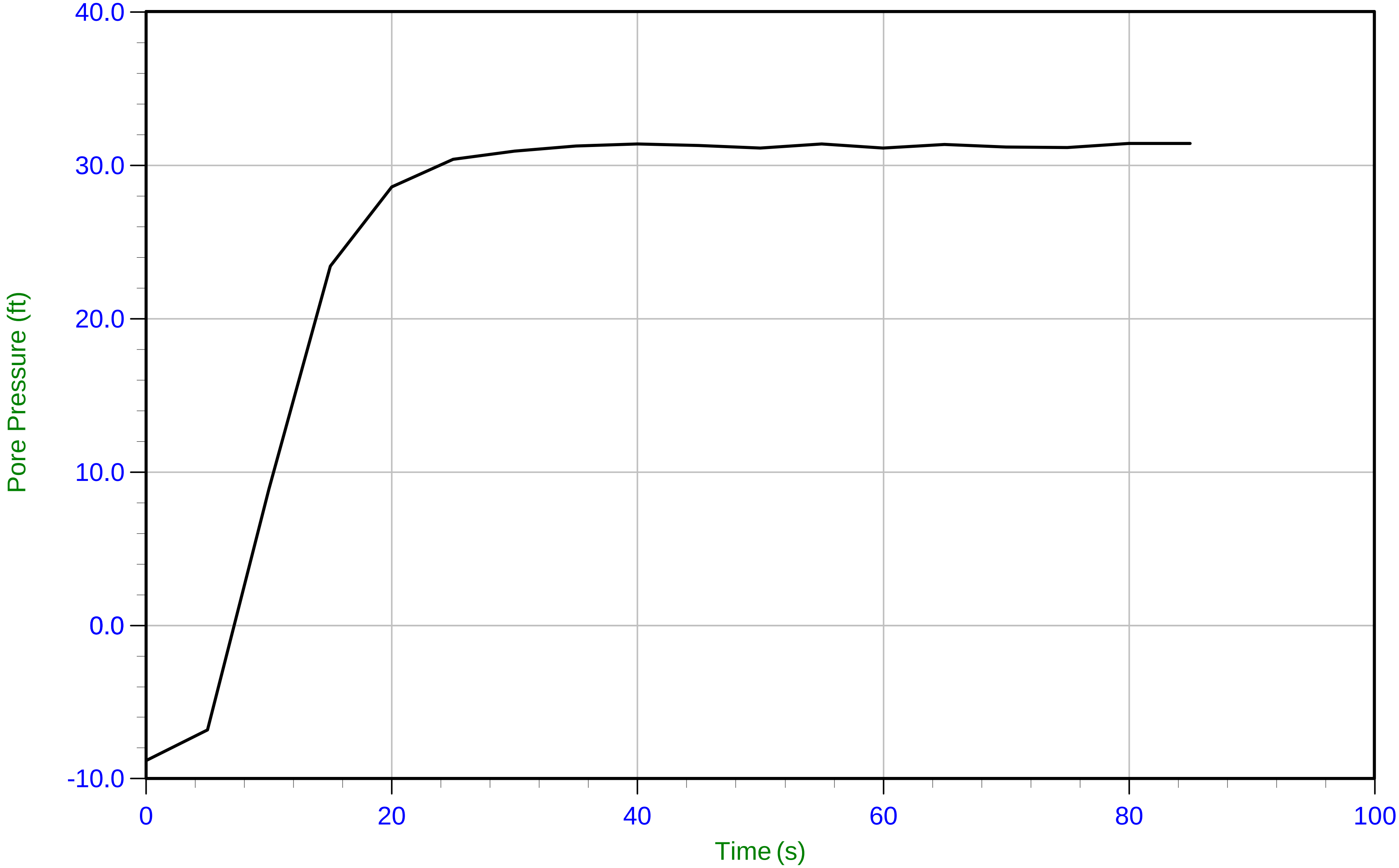
WT: 5.275 m / 17.305 ft
Ueq: 14.1 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 28-Sep-2017 08:42:15
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-29
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP29.PPD
Depth: 14.750 m / 48.392 ft
Duration: 85.0 s

U Min: -8.8 ft
U Max: 31.4 ft

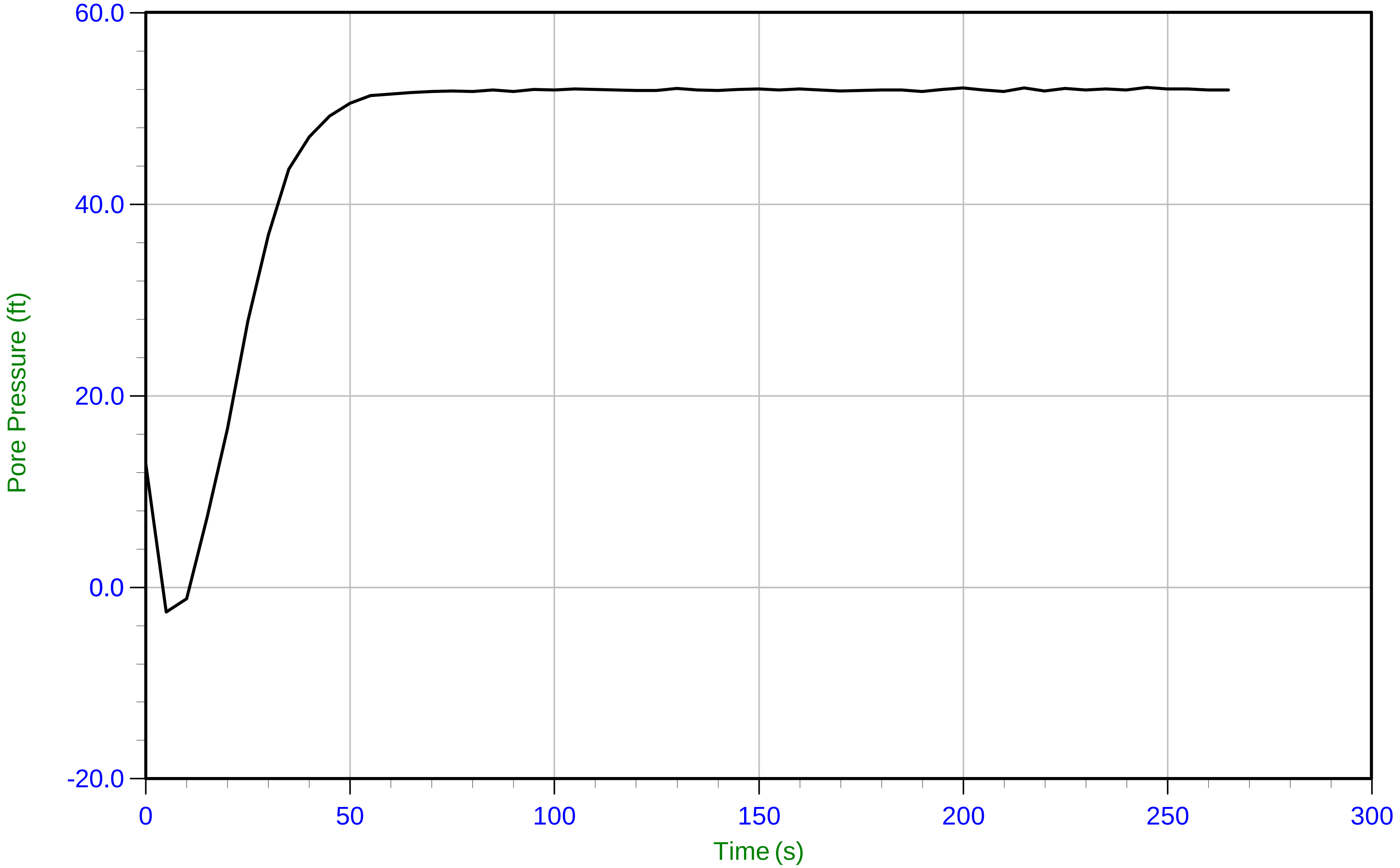
WT: 5.163 m / 16.938 ft
Ueq: 31.5 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 28-Sep-2017 08:42:15
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-29
Cone: AD361 Area=15 cm²



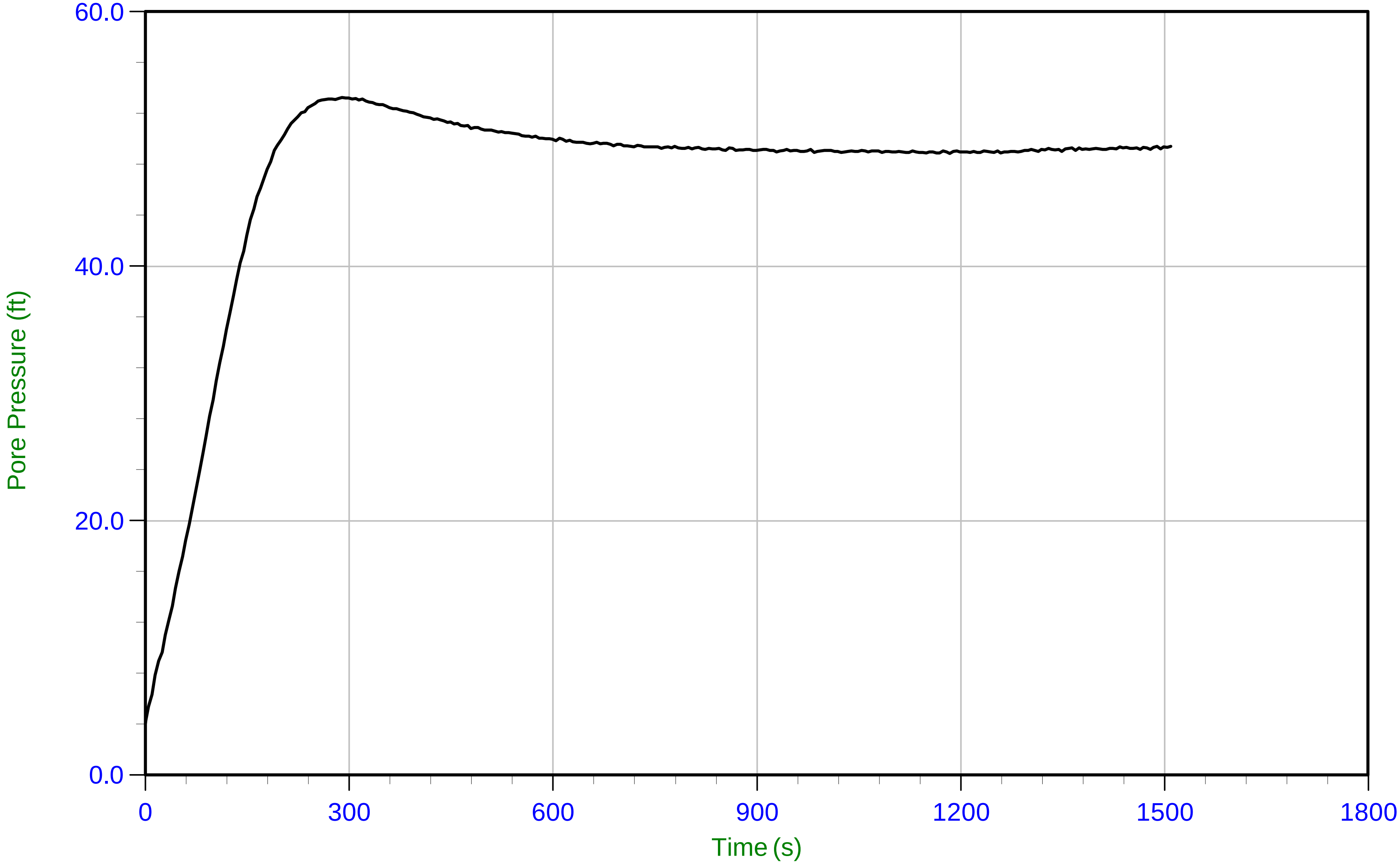
Trace Summary:

Filename: 17-53125_CP29.PPD
Depth: 21.175 m / 69.471 ft
Duration: 265.0 s

U Min: -2.6 ft
U Max: 52.2 ft

WT: 5.281 m / 17.326 ft
Ueq: 52.1 ft

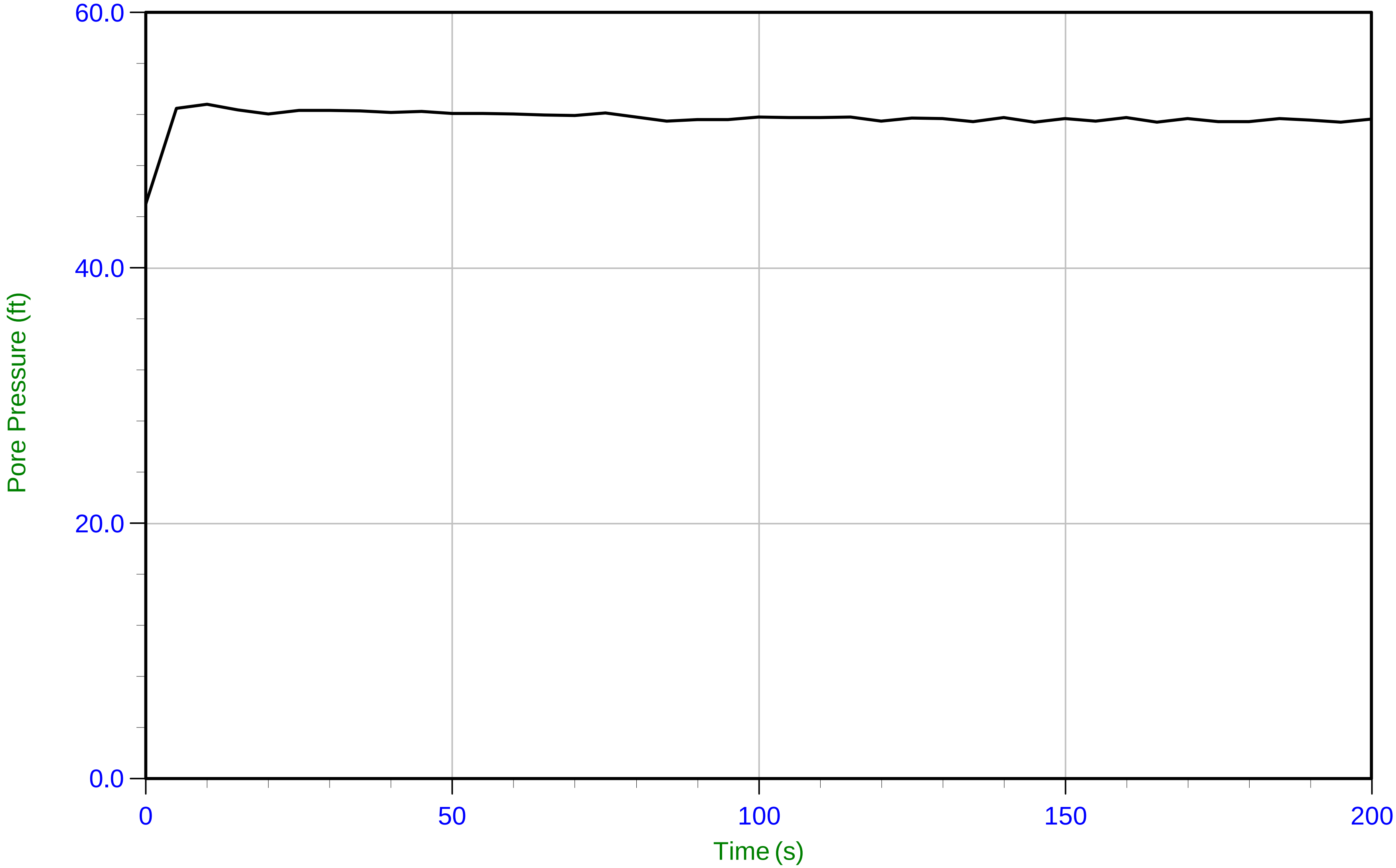
EHS Support	Job No: 17-53125 Date: 28-Sep-2017 11:15:13 Site: The Paint Company, Gibbsboro, NJ
	Sounding: CPT/MIP17-30 Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP30.PPD	U Min: 4.1 ft	WT: 2.471 m / 8.106 ft
Depth: 17.500 m / 57.414 ft	U Max: 53.2 ft	Ueq: 49.3 ft
Duration: 1510.0 s		

EHS Support	Job No: 17-53125 Date: 28-Sep-2017 11:15:13 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-30 Cone: AD361 Area=15 cm²



Trace Summary:

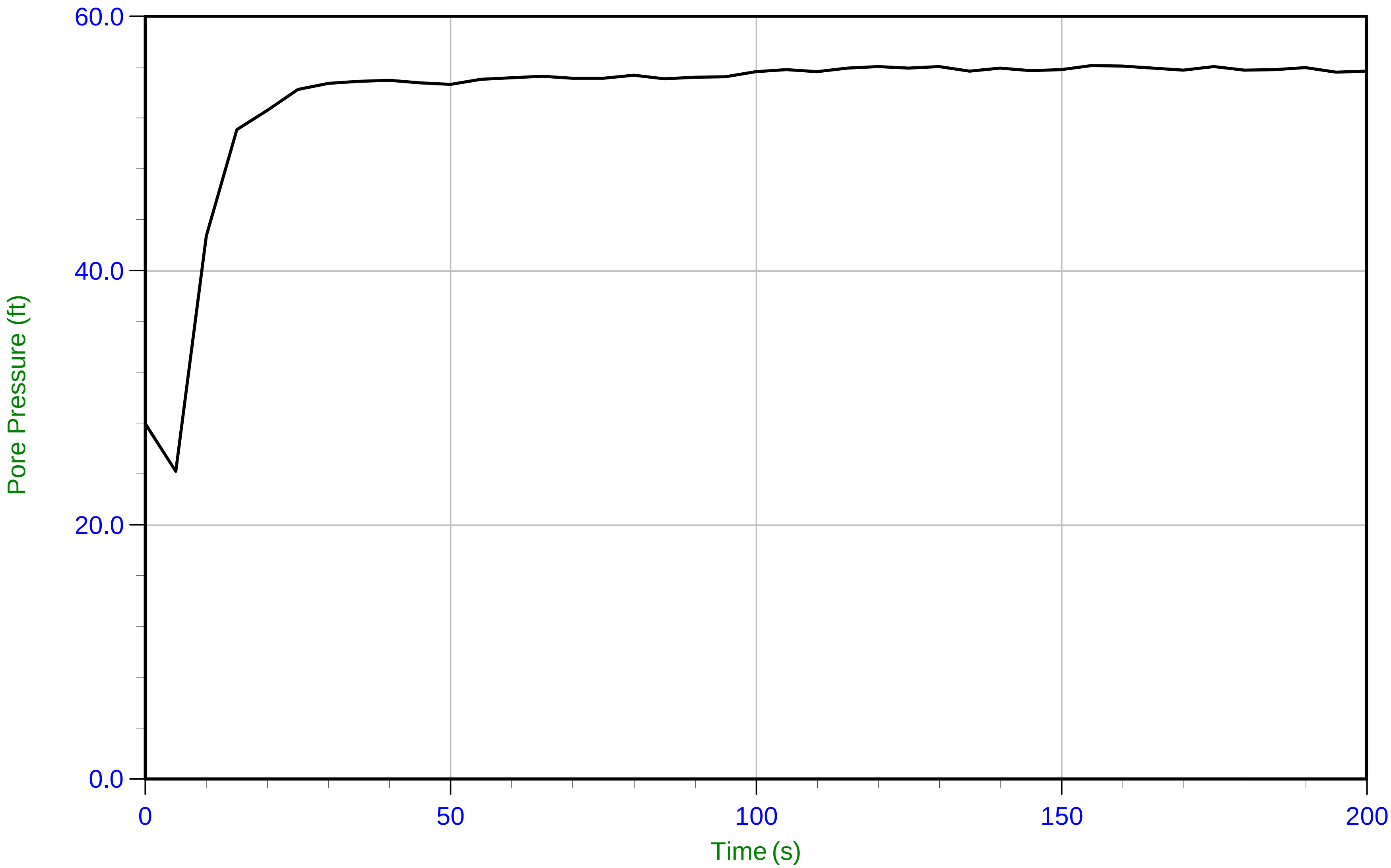
Filename: 17-53125_CP30.PPD	U Min: 45.0 ft	WT: 2.747 m / 9.013 ft
Depth: 18.375 m / 60.285 ft	U Max: 52.8 ft	Ueq: 51.3 ft
Duration: 200.0 s		

CONETEC

EHS Support

Job No: 17-53125
Date: 28-Sep-2017 11:15:13
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-30
Cone: AD361 Area=15 cm²



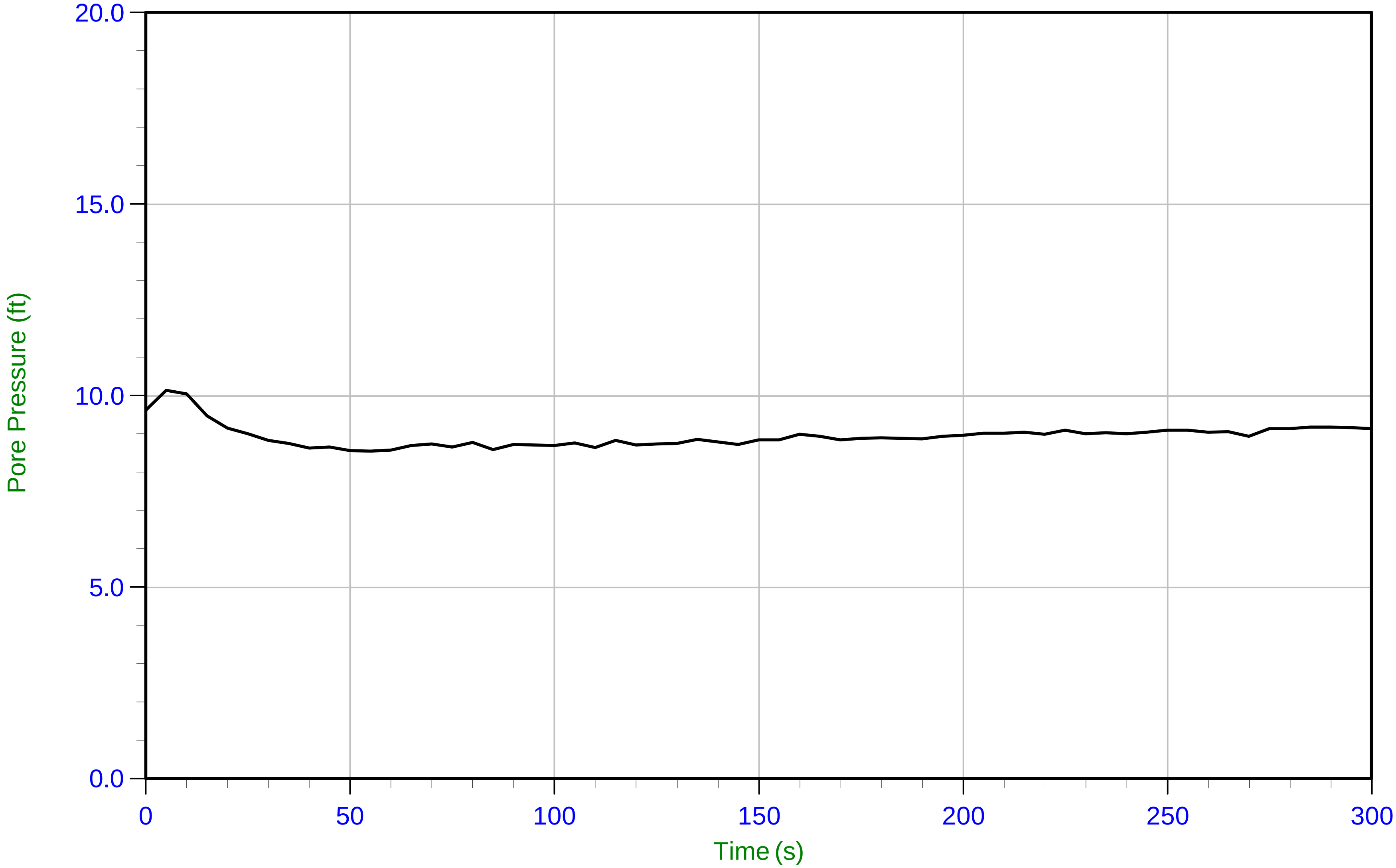
Trace Summary:

Filename: 17-53125_CP30.PPD
Depth: 20.275 m / 66.518 ft
Duration: 200.0 s

U Min: 24.2 ft
U Max: 56.1 ft

WT: 3.317 m / 10.883 ft
Ueq: 55.6 ft

EHS Support	Job No: 17-53125 Date: 29-Sep-2017 14:09:46 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-32 Cone: AD361 Area=15 cm²



Trace Summary:

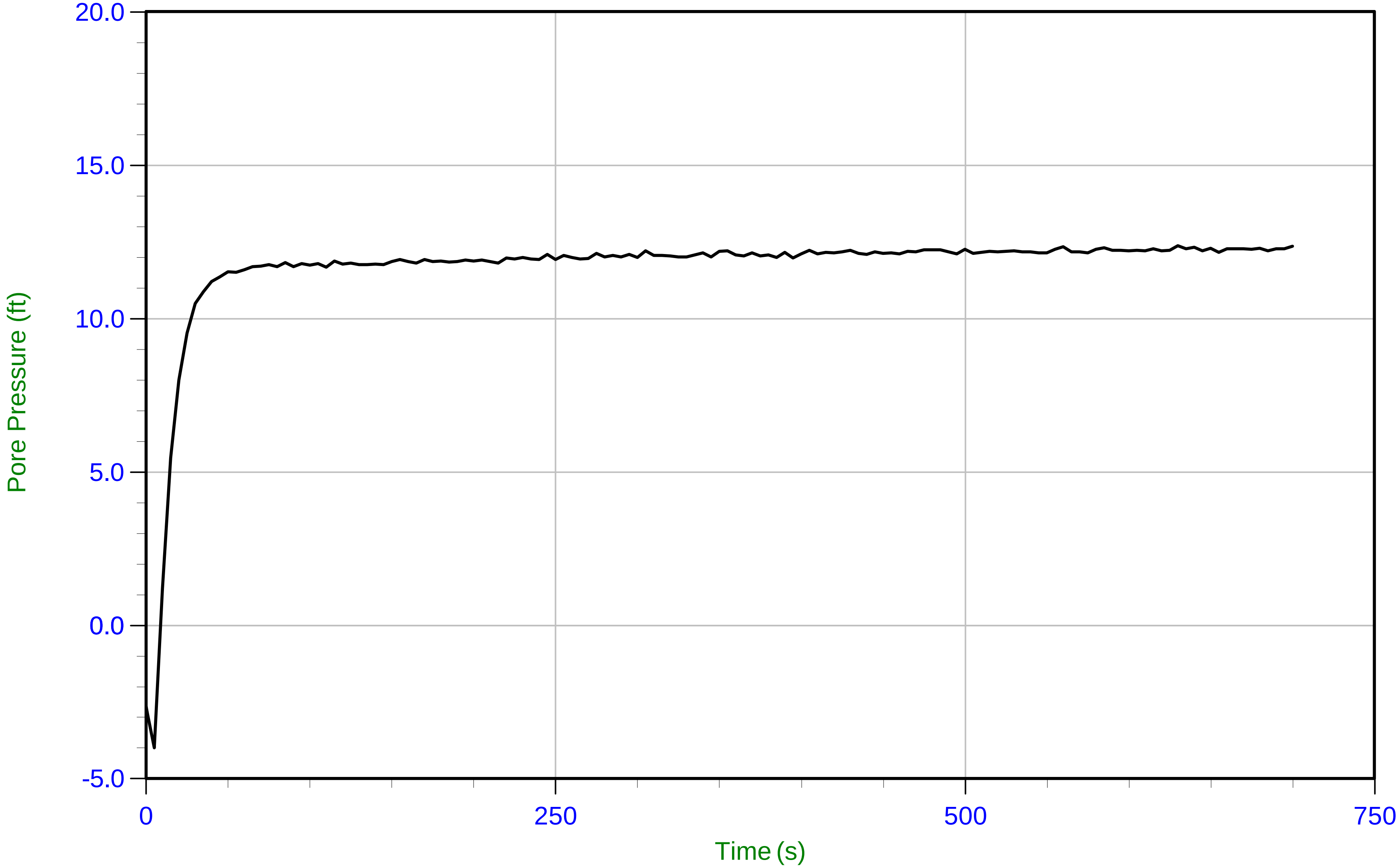
Filename: 17-53125_CP32.PPD	U Min: 8.5 ft	WT: 4.682 m / 15.360 ft
Depth: 7.475 m / 24.524 ft	U Max: 10.1 ft	Ueq: 9.2 ft
Duration: 300.0 s		

CONETEC

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 14:09:46
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-32
Cone: AD361 Area=15 cm²



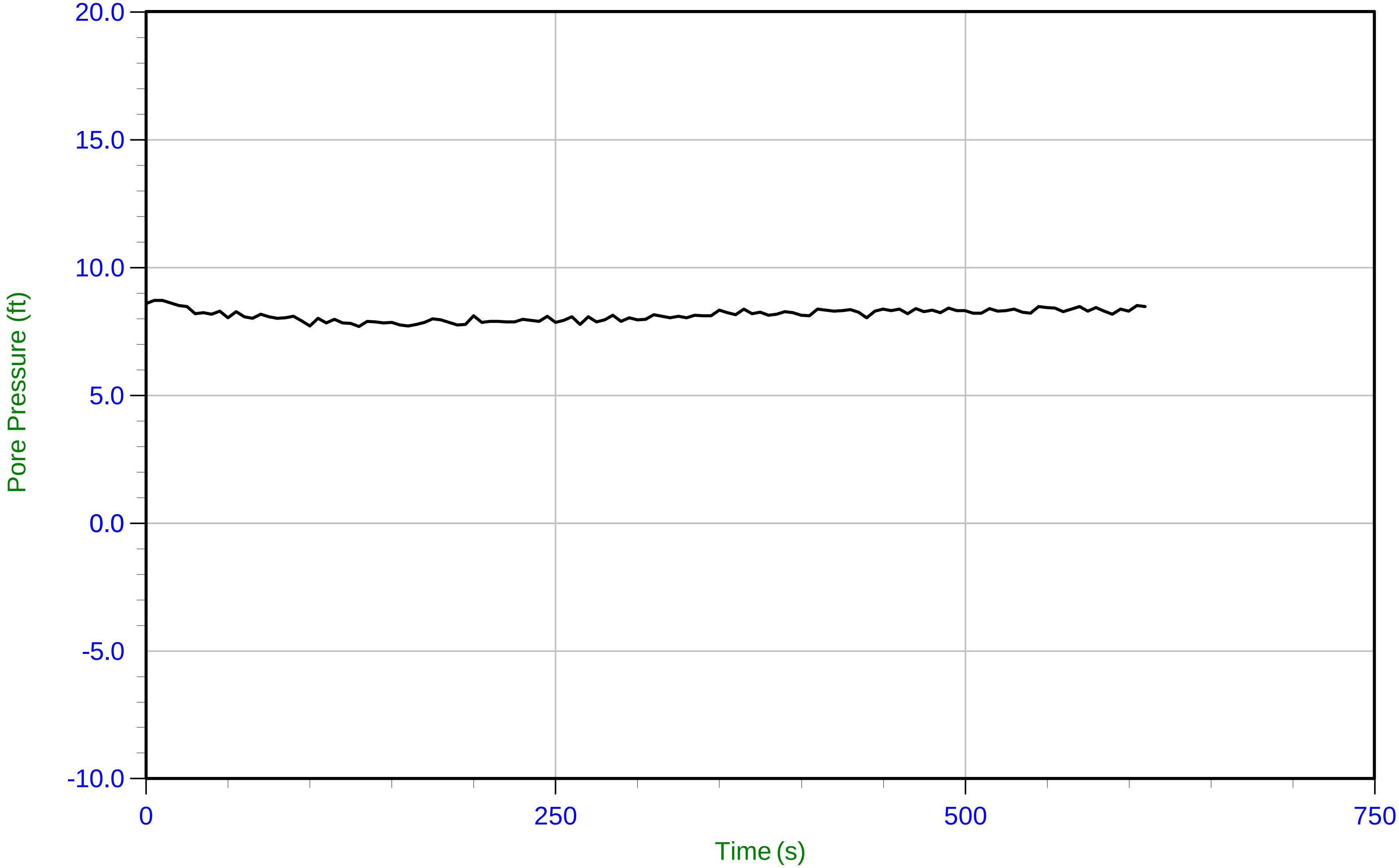
Trace Summary:

Filename: 17-53125_CP32.PPD
Depth: 8.400 m / 27.559 ft
Duration: 700.0 s

U Min: -4.0 ft
U Max: 12.4 ft

WT: 4.659 m / 15.286 ft
Ueq: 12.3 ft

EHS Support	Job No: 17-53125 Date: 29-Sep-2017 08:24:59 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-33 Cone: AD361 Area=15 cm²



Trace Summary:

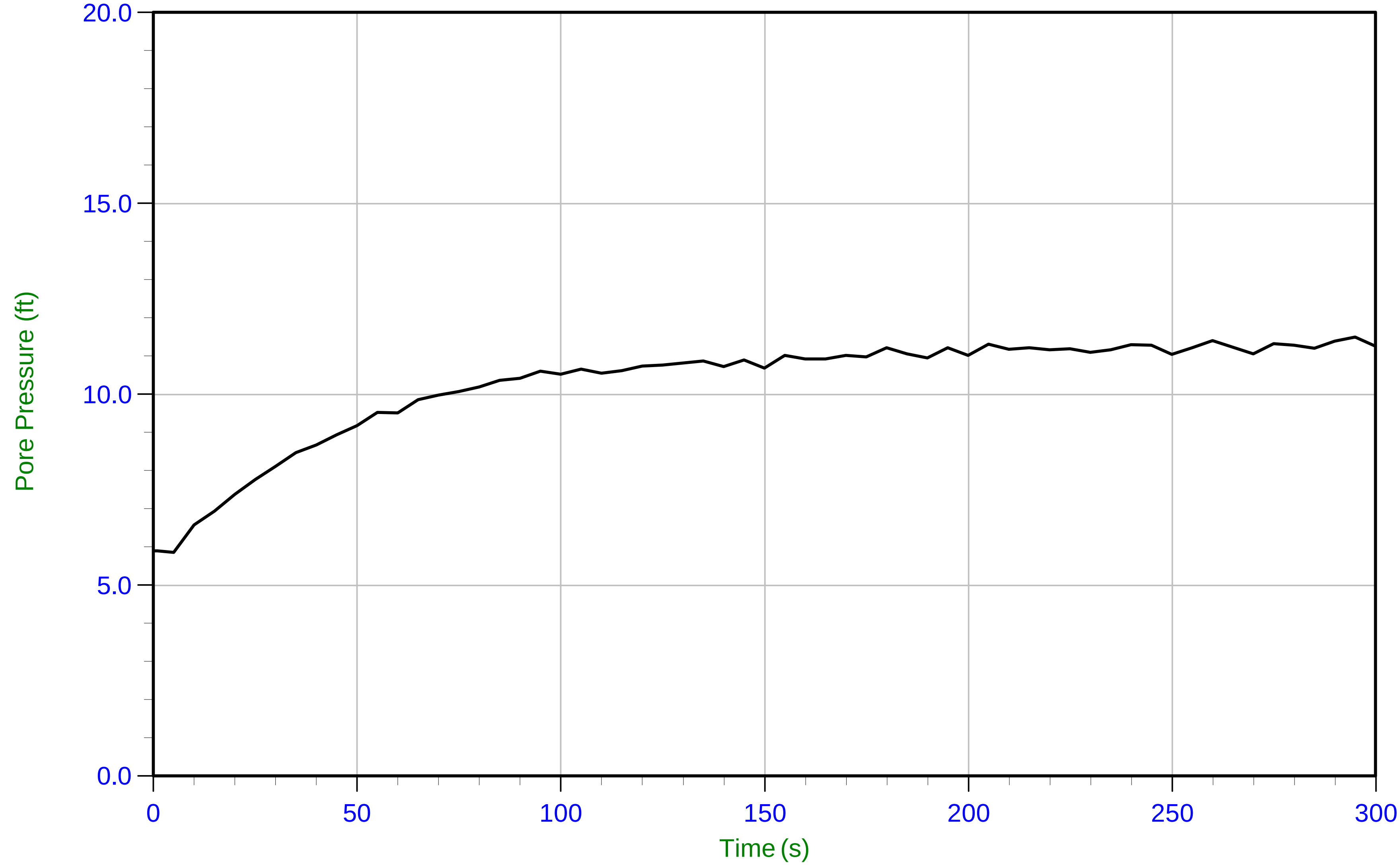
Filename: 17-53125_CP33.PPD	U Min: 7.7 ft	WT: 4.887 m / 16.033 ft
Depth: 7.425 m / 24.360 ft	U Max: 8.7 ft	Ueq: 8.3 ft
Duration: 610.0 s		

CONETEC

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 08:24:59
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-33
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP33.PPD
Depth: 8.300 m / 27.231 ft
Duration: 300.0 s

U Min: 5.9 ft
U Max: 11.5 ft

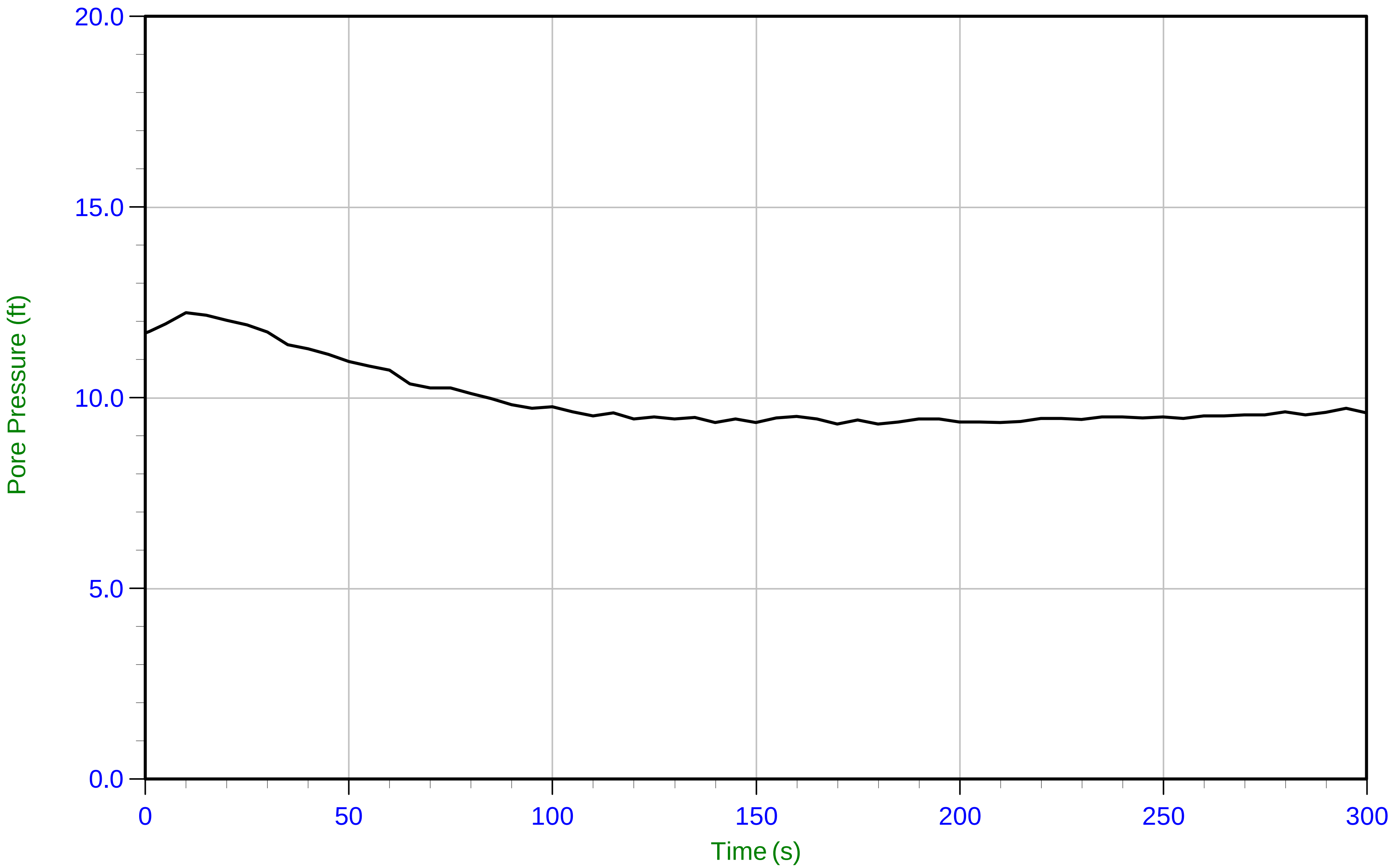
WT: 4.864 m / 15.958 ft
Ueq: 11.3 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 09:49:14
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-34
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP34.PPD
Depth: 8.350 m / 27.395 ft
Duration: 300.0 s

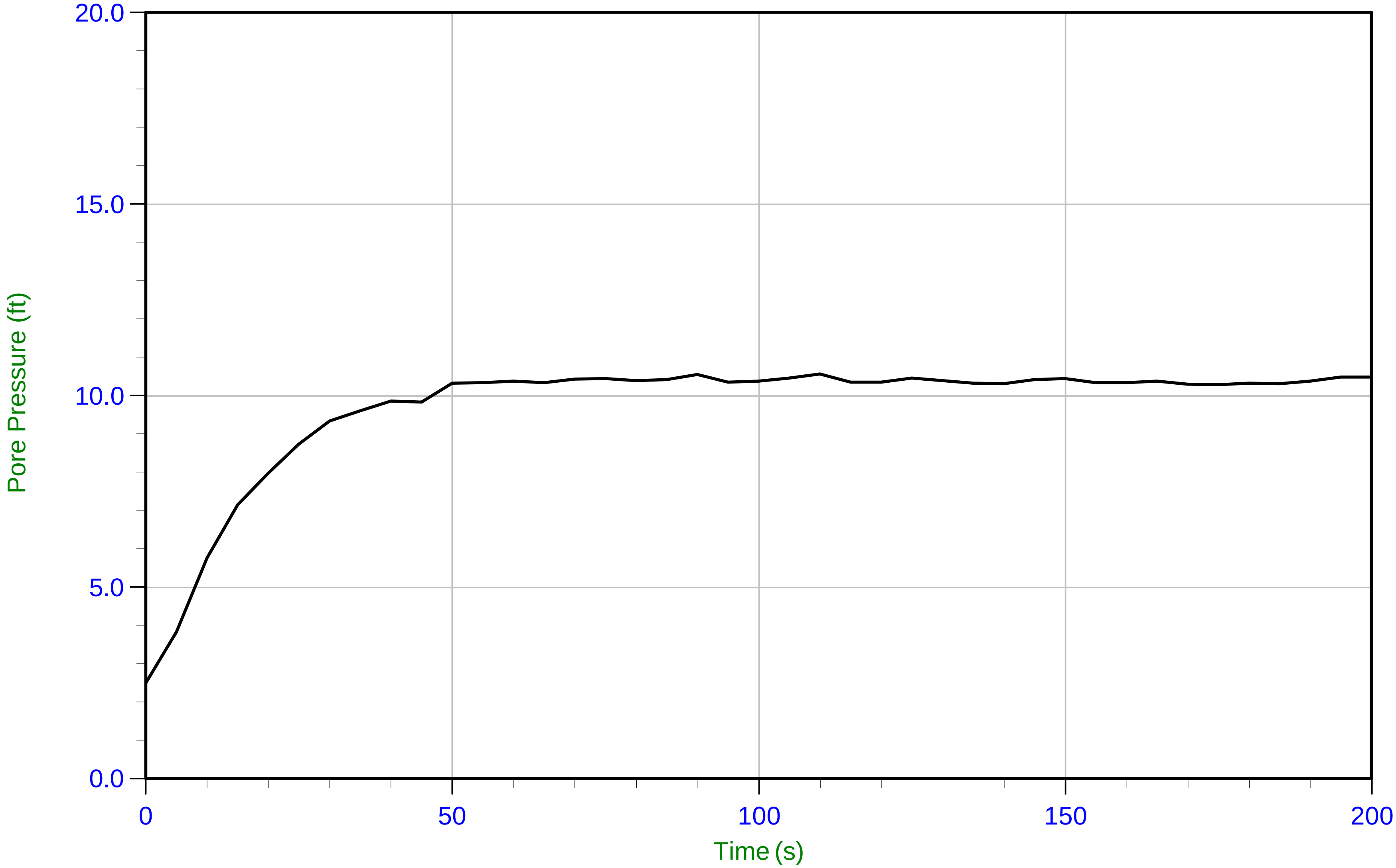
U Min: 9.3 ft
U Max: 12.2 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 09:49:14
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-34
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP34.PPD
Depth: 8.650 m / 28.379 ft
Duration: 200.0 s

U Min: 2.5 ft
U Max: 10.6 ft

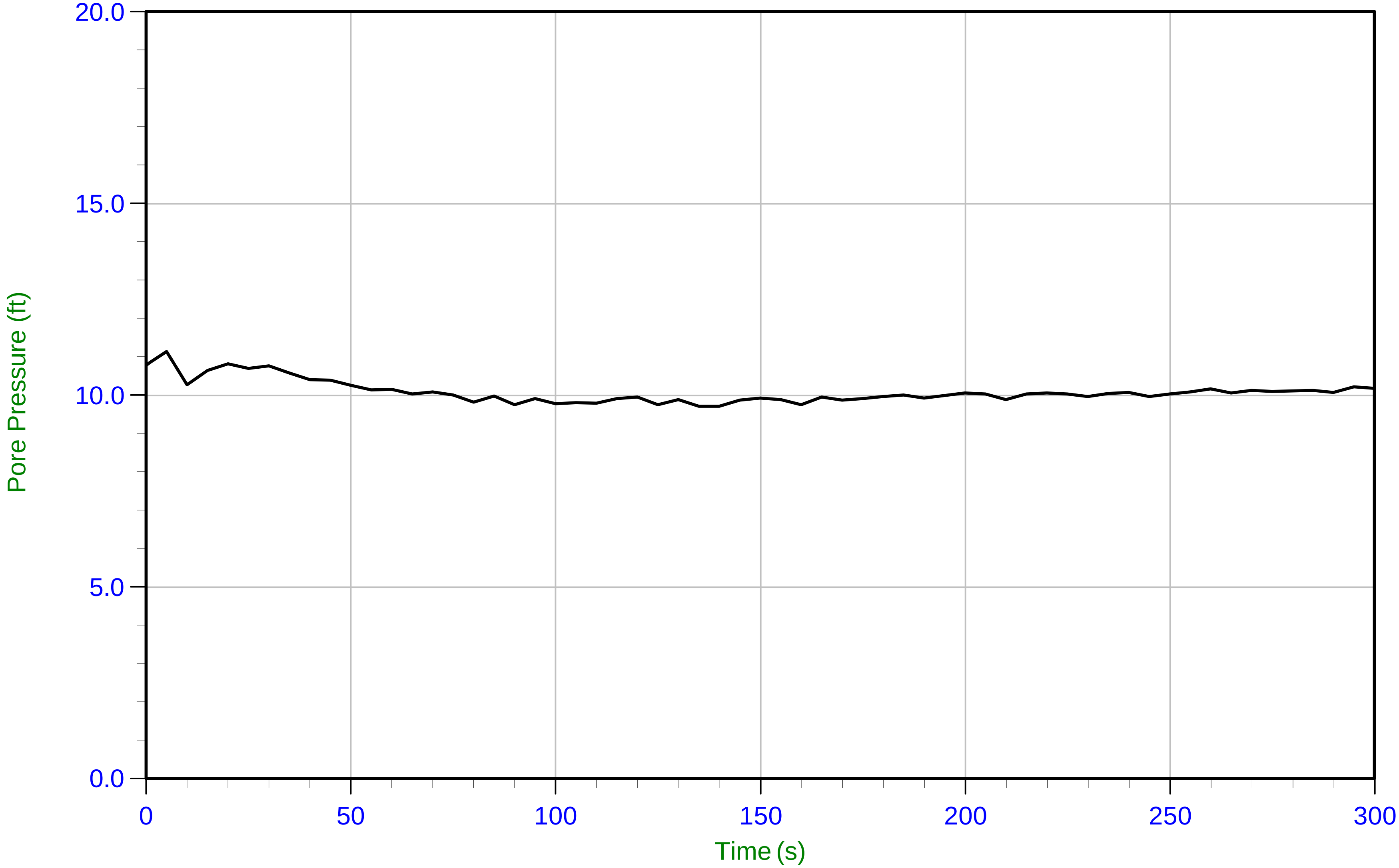
WT: 5.480 m / 17.979 ft
Ueq: 10.4 ft

CONETEC

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 11:10:07
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-35
Cone: AD361 Area=15 cm²

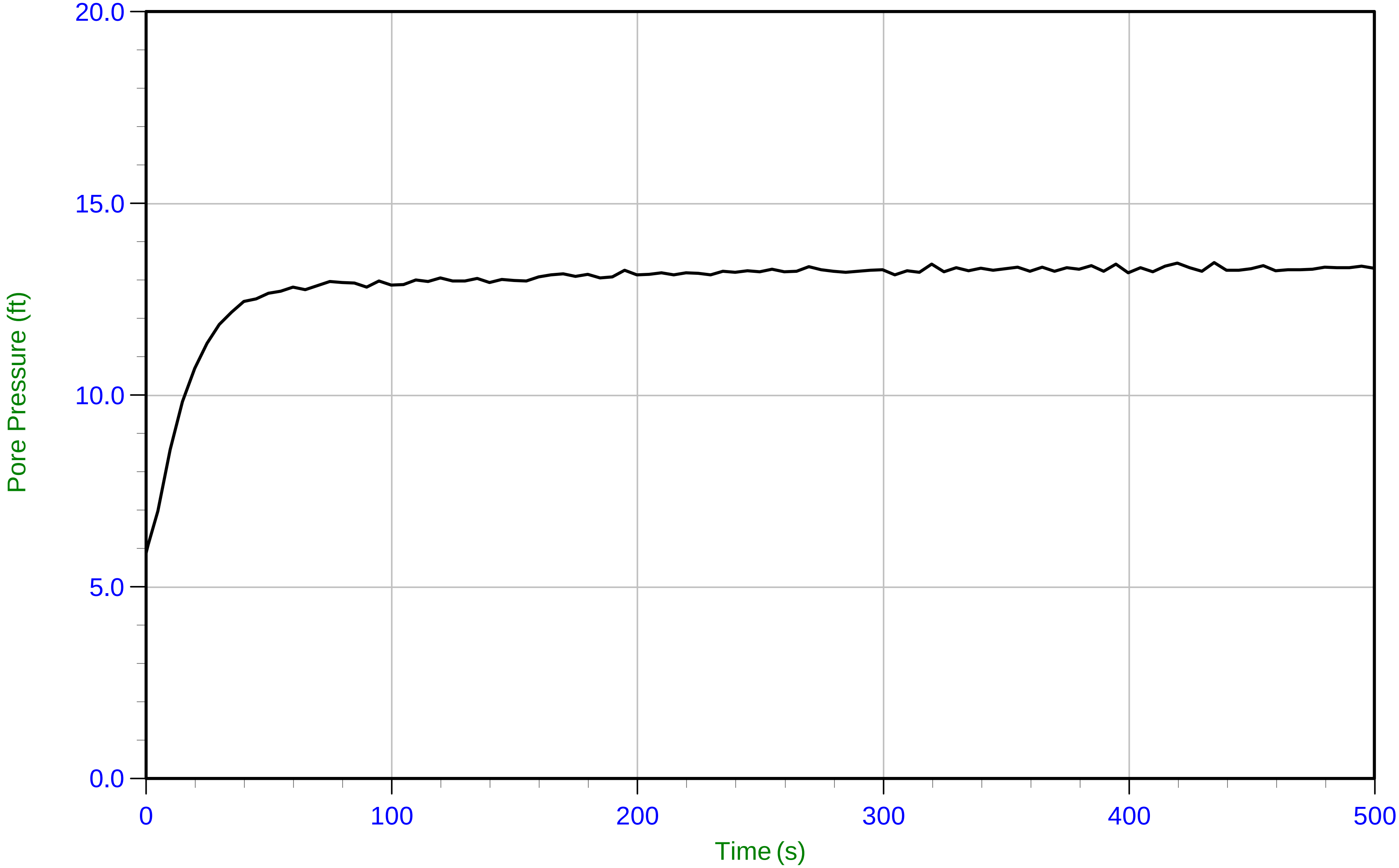


Trace Summary:

Filename: 17-53125_CP35.PPD
Depth: 7.475 m / 24.524 ft
Duration: 300.0 s

U Min: 9.7 ft
U Max: 11.1 ft

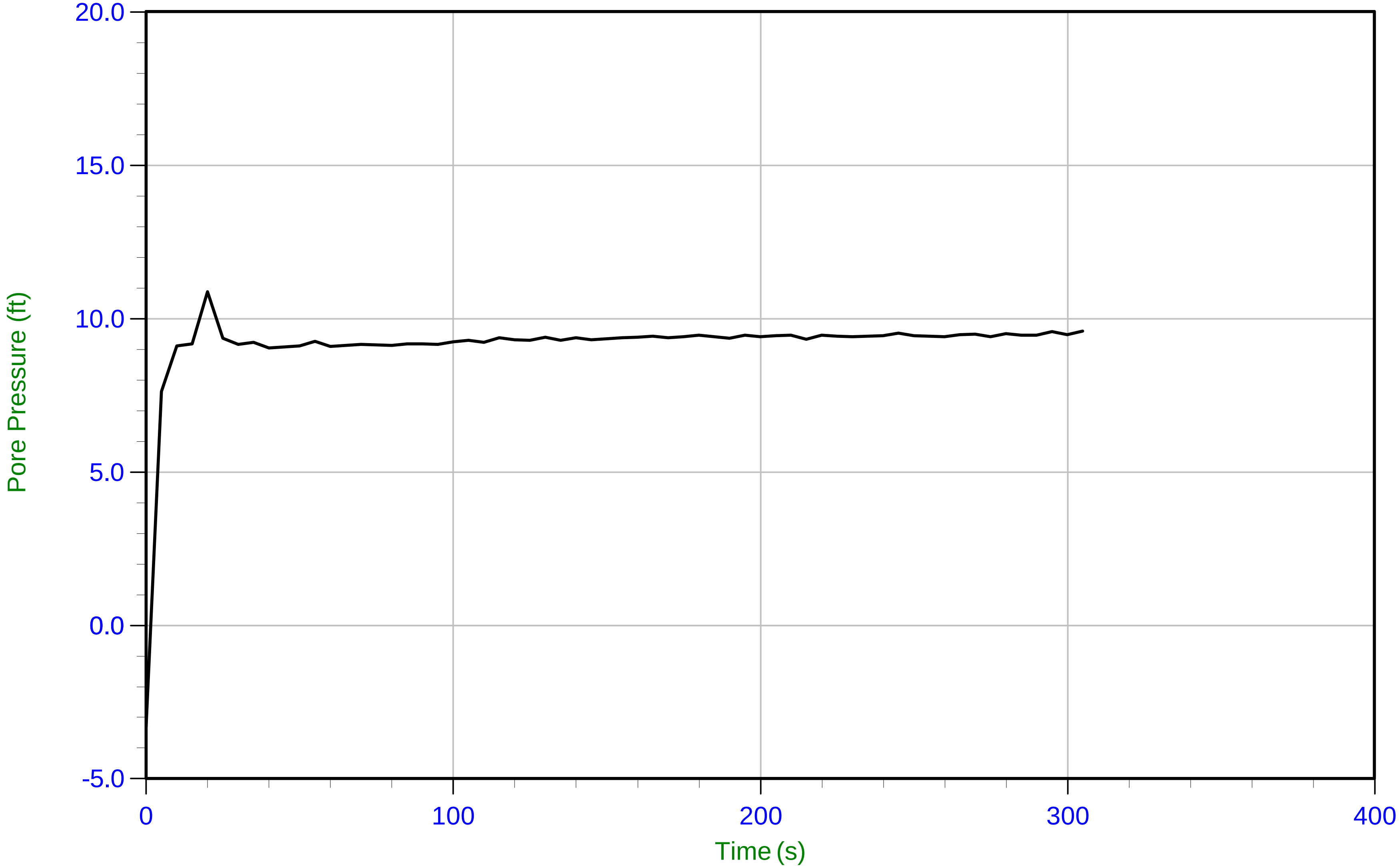
CONETEC	*EHS Support*	Job No: 17-53125 Date: 29-Sep-2017 11:10:07 Site: The Paint Company, Gibbsboro, NJ	Sounding: CPT/MIP17-35 Cone: AD361 Area=15 cm²



Trace Summary:			
	Filename: 17-53125_CP35.PPD	U Min: 5.9 ft	WT: 4.316 m / 14.158 ft
	Depth: 8.350 m / 27.395 ft	U Max: 13.5 ft	Ueq: 13.2 ft
	Duration: 500.0 s		

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 13:01:57
Site: The Paint Company, Gibbsboro, NJ
Sounding: CPT/MIP17-36
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP36.PPD
Depth: 7.450 m / 24.442 ft
Duration: 305.0 s

U Min: -3.3 ft
U Max: 10.9 ft

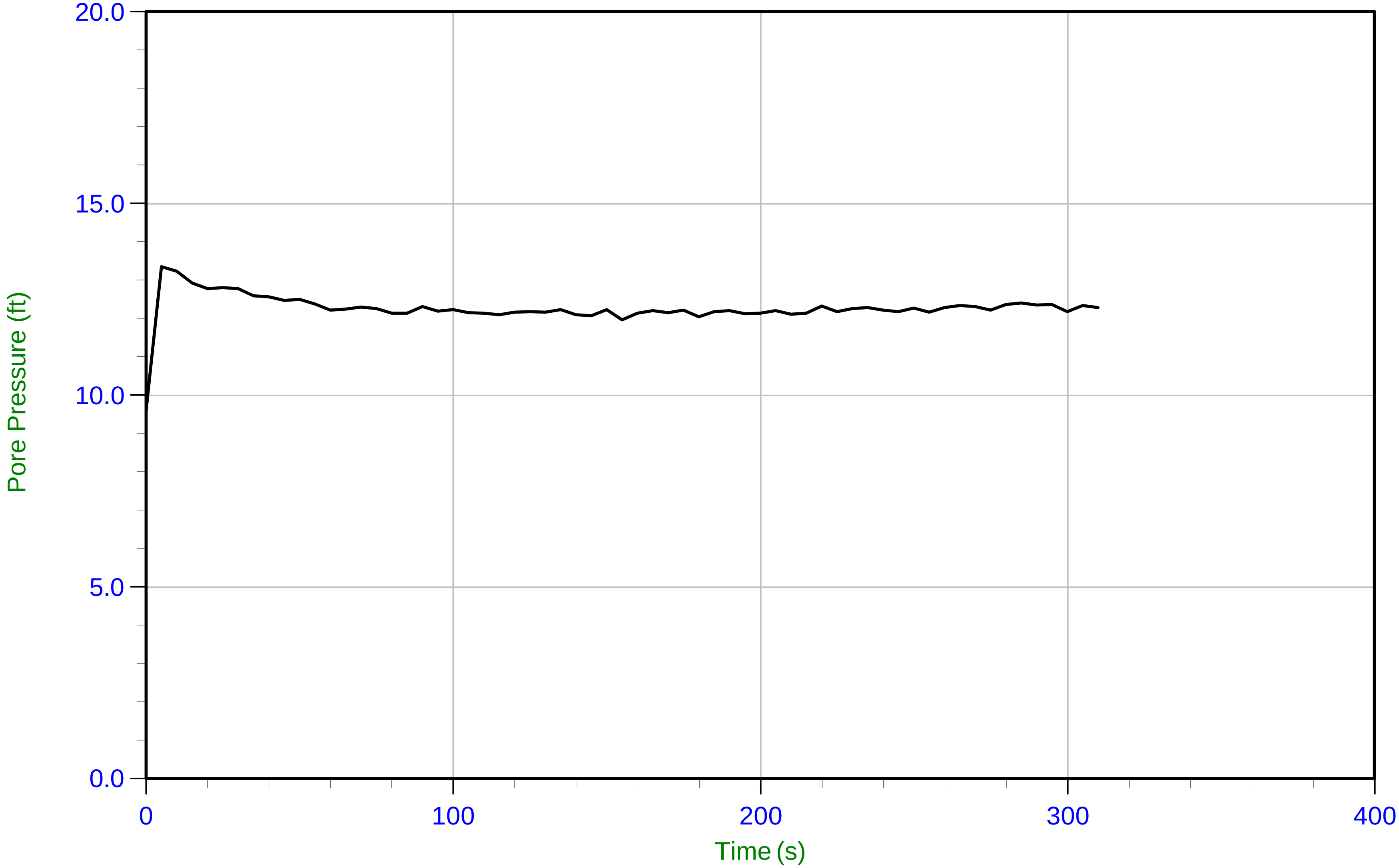
WT: 4.541 m / 14.897 ft
Ueq: 9.5 ft

ConeTec

EHS Support

Job No: 17-53125
Date: 29-Sep-2017 13:01:57
Site: The Paint Company, Gibbsboro, NJ

Sounding: CPT/MIP17-36
Cone: AD361 Area=15 cm²



Trace Summary:

Filename: 17-53125_CP36.PPD
Depth: 8.350 m / 27.395 ft
Duration: 310.0 s

U Min: 9.6 ft
U Max: 13.4 ft

WT: 4.582 m / 15.031 ft
Ueq: 12.4 ft

MIP Report and Logs

ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | UVOST | CPT | PST | EC | GTP

Field Services Report
Membrane Interface Probe® (MIP)

FORMER SHERWIN-WILLIAMS MANUFACTURING PLANT
FOSTER AVE
GIBBSBORO, NEW JERSEY

PREPARED FOR:
Mr. Bruce Miller
ConeTec, Inc.
436 Commerce Lane, Unit C
West Berlin, NJ 08091

PREPARED BY:
ASC Tech Services
11275 Sunrise Gold Circle, Suite R
Rancho Cordova, CA 95742-6561

October 18, 2017

ASC Project: A06082017-01

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1 INTRODUCTION

This report was prepared by ASC Tech Services (ASC) summarizing a Membrane Interface Probe (MIP) field screening conducted on behalf of Weston Solutions (Weston) and EHS Support (EHS). The field services were conducted associated with the former facility located at the Foster Avenue in Gibbsboro, New Jersey (Figure 1).

1.1 Scope of Work

The investigation was conducted from September 19 to September 29, 2017, and consisted of thirty-five (35) MIP screening locations to depths ranging from 11.00 feet (CPT-MIP17-09) to 67.40 feet (CPT-MIP17-29) below ground surface (bgs). ConeTec, Inc. (ConeTec) of West Berlin, New Jersey provided the direct push rig to advance the tooling. Enclosed in this report are the following items for your review and project use:

- MIP raw data;
- Detailed graphs of each MIP push location, which consist of MIP detector responses vs. depth; and
- Cross-Log Correlation figures comparing MIP detector channel responses.

1.2 Objectives

The objectives of this MIP® investigation were to:

- Complete a high-resolution MIP survey in order to delineate the vertical and horizontal extent of hydrocarbon based impacts within the investigation area at various depths depending on the area of concern; and
- Collect data to facilitate better understanding of the contaminant distribution for future field activities, which may include sampling, well installations, and remedial activities.

1.3 Equipment Description

The following LL-MiHpt system configuration was used for this investigation:

Component	Manufacturer	Model #
MIP Contrtoller	Geoprobe Systems	MP6505
MIHPT Probe	Geoprobe Systems	MH6227
HPT Contrtoller	Geoprobe Systems	K6300
GC	SRI GC ECD/FID/PID OI Analytical XSD	Model 310 Model 5360A

The following Sections describe the major components of the low level and MiHpt systems:

1.3.1 Membrane Interface Probe® (MIP)

The Membrane Interface Probe® (MIP) is a subsurface field screening tool with semi-quantitative capabilities for hydrocarbons. The MIP membrane acts as an interface between contaminants in the subsurface and gas phase detectors at the surface. Volatile hydrocarbons in the subsurface diffuse across the membrane and partition into a stream of carrier gas (nitrogen) where they are be swept to gas phase detectors at the surface. The membrane is heated so that travel by VOCs across this film is almost instantaneous. MIP acquisition software logs detector signal responses with depth. The ability to detect a contaminant is determined by the type of detectors being used. Detectors used by ASC include photo ionization detector (PID), electron capture detector (ECD), halogen specific detector (XSD), and flame ionization detector (FID). Each detector is designed for sensitivity to a group or type of contaminant. The ECD and XSD are used for chlorinated (TCE, PCE) contaminant detection, PID is best used for the detection of aromatic hydrocarbons (BTEX compounds), and the FID is best used for straight chained hydrocarbons (methane, butane). These detector signals, in conjunction with the time in which a contaminant takes to return to the surface, are graphed versus depth. The detector information and the electrical conductivity (EC) of the soil are logged and graphed in the field by the FI6000 field instrument. This allows ASC's MIP operator to determine the location of the contaminant, the relative concentration of the contaminant and the soil in which the contaminant is located. The MIP log can be used to determine the depth at which a monitoring well should be placed, at what depth discrete samples need to be collected, and/or the interval for injection of remediation materials.

2 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

As a quality control check, the MiHpt system response is evaluated prior to and upon completion of each MiHpt push location. The purpose of QA/QC testing is to ensure that the instrument is capable of generating good data, to prove that the instrumentation operated properly throughout the course of the log and that the logs have been performed in accordance with established standards. Response testing in MiHpt logging includes performing chemical responses tests using a chemical standard (MIP Response Testing), electrical conductivity (EC) testing, and HPT reference testing. QA/QC testing was conducted consistent with Geoprobe (Geoprobe 2015a, Geoprobe 2015b) and ASTM (ASTM 2016, ASTM 2012) Standards.

2.1 MIP Response Testing

It is crucial that the MiHpt operator and clients have confidence that the MIP detector system is functioning properly and will be able to detect the contaminants present. MIP chemical response testing tests an analog for the expected site compound, i.e. Benzene, Toluene or Gasoline for a petroleum site, PCE of TCE for a dry cleaner sites. This test will validate that the detection system is working from properly from the membrane to the detectors.

Chemical response testing was completed using a three-decade response test using Benzene as the standard at 1 ppm, 10 ppm, and 100 ppm. A statistical summary of MIP chemical response testing is provided in Table 1.

3 MIP DATA EVALUATION

Table 2 of this report presents a statistical evaluation of the raw MIP data collected as part of this investigation. MiHpt boring logs consolidating data collected for each of the MiHpt pushes and cross-log correlations are provided in Appendix B (MiHpt Logs).

4 REFERENCES

ASTM, 2012, D7352-07(2012) Standard Practice for Direct Push Technology for Volatile Contaminant Logging with the Membrane Interface Probe (MIP): ASTM International, West Conshohocken, PA, 2007, 11 p. http://www.astm.org/Standards/D7352.htm

ASTM, 2016, D8037 / D8037M-16, Standard Practice for Direct Push Hydraulic Logging for Profiling Variations of Permeability in Soils: ASTM International, West Conshohocken, PA, 2016, 21 p. https://www.astm.org/Standards/D8037.htm

ASTM, 2011; ASTM D7242 - 06 Standard Practice for Field Pneumatic Slug (Instantaneous Change in Head) Tests to Determine Hydraulic Properties of Aquifers with Direct Push Groundwater Samplers: ASTM International, West Conshohocken, PA. http://www.astm.org/Standards/D7242.htm

ASTM, 2010; D6235-04(2010) Standard Practice for Expedited Site Characterization of Vadose Zone and Ground Water Contamination at Hazardous Waste Contaminated Sites: ASTM International, West Conshohocken, PA, 2010, 51 p. http://www.astm.org/Standards/D6235.htm

ASTM, 2004, E1912-98(2004); Standard Guide for Accelerated Site Characterization for Confirmed or Suspected Petroleum Releases: ASTM International, West Conshohocken, PA, 2004, 20 p. http://www.astm.org/DATABASE.CART/WITHDRAWN/E1912.htm

Geoprobe, 2015a, Geoprobe® Membrane Interface Probe (MIP), Standard Operating Procedure; Technical Bulletin No. MK3010: Geoprobe Systems, January, 2015, 39 p. http://files.geoprobe.com/pdfs/MIP_SOP_mk3010_0115.pdf

Geoprobe, 2015b, Geoprobe® Hydraulic Profiling Tool (HPT) System, Standard Operating Procedure; Technical Bulletin No. MK3137: Geoprobe Systems, January 2015, 22 p. http://files.geoprobe.com/pdfs/HPT_SOP_mk3010_0115.pdf

Geoprobe, 2011a, Application of Geoprobe® HPT Logging Systems For Geo-Environmental Investigations; Instructional Bulletin No. MK3184: Geoprobe Systems, February, 2011, 36 p. http://files.geoprobe.com/pdfs/mk3184_application_of_hpt_for_geo-environmental_investigations_0.pdf

Geoprobe, 2011b, Geoprobe® Pneumatic Slug Test Kit (GW1600), Installation and Operating Instructions; Instructional Bulletin No. MK3181: Geoprobe Systems, January, 2011, 16 p. http://geoprobe.com/sites/default/files/pdfs/mk3181_pneumatic_slug_test_kit_instructions_for_gw1600.pdf

Geoprobe, 2010, Tech Guide for Calculation of Estimated Hydraulic Conductivity (Est. K) Log from HPT Data: Geoprobe Systems, November 2010, 20 p.

http://files.geoprobe.com/pdfs/tech_guide_estk_v5_0.pdf

TABLES

TABLE 1: Summary of Quality Assurance/Quality Control (QA/QC) Data

MIP Location	Detector	Detector Response (µV)							
		Pre-Log Response				Post-Log Response			
		Baseline	Standard Concentration (Benzene)			Baseline	Standard Concentration (Benzene)		
			1 ppm	10 ppm	100 ppm		1 ppm	10 ppm	100 ppm
CPT-MIP17-01	XSD	5.17E+04	5.32E+04	5.29E+04	5.29E+04	6.07E+04	6.19E+04	6.01E+04	6.04E+04
	ECD	1.49E+06	1.51E+06	1.52E+06	1.52E+06	1.52E+06	1.65E+06	1.56E+06	1.55E+06
	PID	3.21E+05	3.32E+05	6.37E+05	2.44E+06	1.59E+05	1.77E+05	4.16E+05	1.94E+06
	FID	5.15E+04	5.27E+04	5.89E+04	1.04E+05	6.01E+04	5.96E+04	6.54E+04	1.04E+05
CPT-MIP17-02	XSD	6.08E+04	6.19E+04	6.01E+04	6.01E+04	5.67E+04	5.73E+04	5.70E+04	5.64E+04
	ECD	1.54E+06	1.65E+06	1.56E+06	1.55E+06	1.42E+06	1.46E+06	1.45E+06	1.46E+06
	PID	1.59E+05	1.77E+05	4.16E+05	1.94E+06	1.85E+05	1.91E+05	3.35E+05	1.55E+06
	FID	5.97E+04	6.07E+04	6.54E+04	1.04E+05	5.46E+04	5.42E+04	5.72E+04	8.08E+04
CPT-MIP17-03	XSD	5.67E+04	5.73E+04	5.70E+04	5.64E+04	5.89E+04	5.90E+04	5.87E+04	5.86E+04
	ECD	1.42E+06	1.46E+06	1.45E+06	1.46E+06	1.40E+06	1.40E+06	1.42E+06	1.43E+06
	PID	1.85E+05	1.91E+05	3.35E+05	1.55E+06	3.07E+05	3.04E+05	4.43E+05	1.59E+06
	FID	5.46E+04	5.42E+04	5.72E+04	8.08E+04	5.23E+04	5.25E+04	5.41E+04	7.83E+04
CPT-MIP17-04	XSD	4.34E+04	4.36E+04	4.36E+04	4.39E+04	4.73E+04	4.74E+04	4.87E+04	4.76E+04
	ECD	1.34E+06	1.36E+06	1.36E+06	1.36E+06	1.39E+06	1.43E+06	1.43E+06	1.43E+06
	PID	1.76E+05	1.79E+05	2.94E+05	9.79E+05	1.92E+05	1.98E+05	3.13E+05	1.17E+06
	FID	4.34E+04	4.34E+04	4.50E+04	5.63E+04	5.23E+04	5.28E+04	5.43E+04	6.98E+04
CPT-MIP17-05	XSD	4.73E+04	4.74E+04	4.87E+04	4.76E+04	4.86E+04	4.86E+04	4.90E+04	4.90E+04
	ECD	1.39E+06	1.43E+06	1.43E+06	1.43E+06	1.47E+06	1.51E+06	1.50E+06	1.50E+06
	PID	1.92E+05	1.98E+05	3.13E+05	1.17E+06	1.65E+05	1.71E+05	2.58E+05	9.45E+05
	FID	5.23E+04	5.28E+04	5.43E+04	6.98E+04	5.33E+04	5.53E+04	5.63E+04	7.03E+04
CPT-MIP17-06	XSD	4.86E+04	4.86E+04	4.90E+04	4.90E+04	5.21E+04	5.24E+04	5.20E+04	5.16E+04
	ECD	1.47E+06	1.51E+06	1.50E+06	1.50E+06	1.48E+06	1.48E+06	1.48E+06	1.47E+06
	PID	1.65E+05	1.71E+05	2.58E+05	9.45E+05	1.48E+05	1.52E+05	2.17E+05	9.80E+05
	FID	5.33E+04	5.53E+04	5.63E+04	7.03E+04	5.07E+04	5.16E+04	5.14E+04	6.52E+04
CPT-MIP17-07	XSD	5.21E+04	5.24E+04	5.20E+04	5.16E+04	5.37E+04	5.38E+04	5.34E+04	5.34E+04
	ECD	1.48E+06	1.48E+06	1.48E+06	1.47E+06	1.44E+06	1.46E+06	1.45E+06	1.45E+06
	PID	1.48E+05	1.52E+05	2.17E+05	9.80E+05	2.40E+05	2.29E+05	2.74E+05	8.72E+05
	FID	5.07E+04	5.16E+04	5.14E+04	6.52E+04	5.59E+04	5.67E+04	5.59E+04	6.58E+04
CPT-MIP17-08	XSD	5.37E+04	5.38E+04	5.34E+04	5.34E+04	5.70E+04	5.72E+04	5.79E+04	5.75E+04
	ECD	1.44E+06	1.46E+06	1.45E+06	1.45E+06	1.51E+06	1.52E+06	1.52E+06	1.51E+06
	PID	2.40E+05	2.29E+05	2.74E+05	8.72E+05	1.72E+05	1.72E+05	2.33E+05	7.65E+05
	FID	5.59E+04	5.67E+04	5.59E+04	6.58E+04	7.10E+04	7.27E+04	7.11E+04	8.43E+04
CPT-MIP17-09	XSD	3.95E+04	3.96E+04	3.99E+04	4.00E+04	4.24E+04	4.25E+04	4.22E+04	4.21E+04
	ECD	1.33E+06	1.33E+06	1.34E+06	1.34E+06	1.34E+06	1.34E+06	1.34E+06	1.34E+06
	PID	1.42E+05	1.46E+05	2.43E+05	7.26E+05	1.40E+05	1.51E+05	2.20E+05	8.35E+05
	FID	4.29E+04	4.40E+04	4.36E+04	5.50E+04	4.69E+04	4.61E+04	4.80E+04	6.19E+04
CPT-MIP17-10	XSD	4.24E+04	4.25E+04	4.22E+04	4.21E+04	4.48E+04	4.49E+04	4.56E+04	4.50E+04
	ECD	1.34E+06	1.34E+06	1.34E+06	1.34E+06	1.40E+06	1.40E+06	1.40E+06	1.41E+06
	PID	1.40E+05	1.51E+05	2.20E+05	8.35E+05	1.48E+05	1.54E+05	2.34E+05	8.59E+05
	FID	4.69E+04	4.61E+04	4.80E+04	6.19E+04	5.46E+04	5.55E+04	5.70E+04	6.98E+04
CPT-MIP17-11	XSD	4.48E+04	4.49E+04	4.56E+04	4.50E+04	5.34E+04	5.36E+04	5.35E+04	5.32E+04
	ECD	1.40E+06	1.40E+06	1.40E+06	1.41E+06	1.53E+06	1.54E+06	1.54E+06	1.55E+06
	PID	1.48E+05	1.54E+05	2.34E+05	8.59E+05	1.54E+05	1.57E+05	1.99E+05	5.84E+05
	FID	5.46E+04	5.55E+04	5.70E+04	6.98E+04	7.13E+04	7.13E+04	7.23E+04	8.16E+04
CPT-MIP17-12	XSD	5.17E+04	5.22E+04	5.24E+04	5.22E+04	4.61E+04	4.59E+04	4.72E+04	4.69E+04
	ECD	1.54E+06	1.55E+06	1.55E+06	1.56E+06	1.52E+06	1.52E+06	1.54E+06	1.54E+06
	PID	1.33E+05	1.39E+05	1.78E+05	5.12E+05	1.31E+05	1.37E+05	1.97E+05	8.53E+05
	FID	7.25E+04	7.16E+04	7.44E+04	8.14E+04	5.24E+04	5.34E+04	5.58E+04	7.33E+04
CPT-MIP17-13	XSD	4.61E+04	4.59E+04	4.72E+04	4.69E+04	5.20E+04	5.22E+04	5.13E+04	5.11E+04
	ECD	1.52E+06	1.52E+06	1.54E+06	1.54E+06	1.57E+06	1.57E+06	1.57E+06	1.57E+06
	PID	1.31E+05	1.37E+05	1.97E+05	8.53E+05	1.16E+05	1.22E+05	1.80E+05	1.25E+06
	FID	5.24E+04	5.34E+04	5.58E+04	7.33E+04	7.15E+04	7.20E+04	7.30E+04	1.06E+05

TABLE 1 (continued): Summary of Quality Assurance/Quality Control (QA/QC) Data

MIP Location	Detector	Detector Response (µV)							
		Pre-Log Response				Post-Log Response			
		Baseline	Standard Concentration (Benzene)			Baseline	Standard Concentration (Benzene)		
			1 ppm	10 ppm	100 ppm		1 ppm	10 ppm	100 ppm
CPT-MIP17-14	XSD	4.06E+04	4.07E+04	4.07E+04	4.00E+04	4.50E+04	4.51E+04	4.52E+04	4.53E+04
	ECD	1.34E+06	1.34E+06	1.33E+06	1.33E+06	1.39E+06	1.39E+06	1.40E+06	1.40E+06
	PID	1.32E+05	1.39E+05	2.41E+05	1.13E+06	1.37E+05	1.41E+05	1.84E+05	6.98E+05
	FID	3.52E+04	3.60E+04	3.72E+04	5.48E+04	4.56E+04	4.57E+04	4.69E+04	5.82E+04
CPT-MIP17-15	XSD	4.50E+04	4.51E+04	4.52E+04	4.53E+04	4.68E+04	4.71E+04	4.68E+04	4.65E+04
	ECD	1.39E+06	1.39E+06	1.40E+06	1.40E+06	1.42E+06	1.42E+06	1.42E+06	1.42E+06
	PID	1.37E+05	1.41E+05	1.84E+05	6.98E+05	1.21E+05	1.40E+05	2.58E+05	1.36E+06
	FID	4.56E+04	4.57E+04	4.69E+04	5.82E+04	4.84E+04	4.98E+04	5.23E+04	8.02E+04
CPT-MIP17-16	XSD	4.54E+04	4.56E+04	4.55E+04	4.56E+04	4.86E+04	4.89E+04	4.82E+04	4.78E+04
	ECD	1.39E+06	1.40E+06	1.40E+06	1.40E+06	1.48E+06	1.48E+06	1.48E+06	1.47E+06
	PID	1.07E+05	1.24E+05	2.09E+05	1.26E+06	1.13E+05	1.22E+05	2.05E+05	7.48E+05
	FID	4.74E+04	4.67E+04	4.96E+04	7.60E+04	5.57E+04	5.57E+04	5.84E+04	7.30E+04
CPT-MIP17-17	XSD	4.86E+04	4.89E+04	4.82E+04	4.78E+04	5.10E+04	5.12E+04	5.14E+04	5.16E+04
	ECD	1.48E+06	1.48E+06	1.48E+06	1.47E+06	1.48E+06	1.48E+06	1.48E+06	1.49E+06
	PID	1.13E+05	1.22E+05	2.05E+05	7.48E+05	1.70E+05	1.72E+05	2.61E+05	9.48E+05
	FID	5.57E+04	5.57E+04	5.84E+04	7.30E+04	5.95E+04	6.09E+04	6.29E+04	8.32E+04
CPT-MIP17-18	XSD	3.06E+04	3.10E+04	3.12E+04	3.14E+04	4.83E+04	4.86E+04	4.87E+04	4.90E+04
	ECD	1.50E+06	1.50E+06	1.50E+06	1.50E+06	1.43E+06	1.43E+06	1.44E+06	1.44E+06
	PID	1.46E+05	1.51E+05	2.54E+05	1.07E+06	1.44E+05	1.51E+05	2.52E+05	9.64E+05
	FID	3.72E+04	3.76E+04	3.93E+04	6.21E+04	4.60E+04	4.66E+04	4.85E+04	6.96E+04
CPT-MIP17-19	XSD	4.83E+04	4.86E+04	4.87E+04	4.90E+04	5.31E+04	5.36E+04	5.35E+04	5.32E+04
	ECD	1.43E+06	1.43E+06	1.44E+06	1.44E+06	1.54E+06	1.54E+06	1.54E+06	1.54E+06
	PID	1.44E+05	1.51E+05	2.52E+05	9.64E+05	1.07E+05	1.12E+05	1.72E+05	6.69E+05
	FID	4.60E+04	4.66E+04	4.85E+04	6.96E+04	6.67E+04	6.84E+04	6.94E+04	8.44E+04
CPT-MIP17-20	XSD	5.01E+04	5.07E+04	5.07E+04	5.07E+04	5.53E+04	5.56E+04	5.52E+04	5.45E+04
	ECD	1.48E+06	1.49E+06	1.49E+06	1.50E+06	1.61E+06	1.61E+06	1.60E+06	1.61E+06
	PID	9.83E+04	1.05E+05	1.66E+05	7.19E+05	1.35E+05	1.41E+05	1.88E+05	5.90E+05
	FID	6.65E+04	6.76E+04	6.93E+04	8.74E+04	7.44E+04	7.58E+04	7.37E+04	8.98E+04
CPT-MIP17-21	XSD	5.53E+04	5.56E+04	5.52E+04	5.45E+04	5.40E+04	5.46E+04	5.54E+04	5.58E+04
	ECD	1.61E+06	1.61E+06	1.60E+06	1.61E+06	1.56E+06	1.56E+06	1.57E+06	1.58E+06
	PID	1.35E+05	1.41E+05	1.88E+05	5.90E+05	1.26E+05	1.29E+05	1.79E+05	6.60E+05
	FID	7.44E+04	7.58E+04	7.37E+04	8.98E+04	6.89E+04	7.06E+04	7.06E+04	9.07E+04
CPT-MIP17-22	XSD	4.18E+04	4.21E+04	4.23E+04	4.23E+04	4.78E+04	4.78E+04	4.78E+04	4.80E+04
	ECD	1.38E+06	1.38E+06	1.36E+06	1.37E+06	1.35E+06	1.36E+06	1.36E+06	1.36E+06
	PID	1.64E+05	1.74E+05	2.05E+05	4.72E+05	9.86E+04	1.05E+05	1.53E+05	5.91E+05
	FID	4.17E+04	4.24E+04	4.26E+04	4.62E+04	4.40E+04	4.52E+04	4.54E+04	5.73E+04
CPT-MIP17-23	XSD	4.78E+04	4.78E+04	4.78E+04	4.80E+04	5.40E+04	5.43E+04	5.43E+04	5.42E+04
	ECD	1.35E+06	1.36E+06	1.36E+06	1.36E+06	1.46E+06	1.47E+06	1.47E+06	1.46E+06
	PID	9.86E+04	1.05E+05	1.53E+05	5.91E+05	1.10E+05	1.15E+05	1.76E+05	4.95E+05
	FID	4.40E+04	4.52E+04	4.54E+04	5.73E+04	5.48E+04	5.53E+04	5.67E+04	6.43E+04
CPT-MIP17-24	XSD	5.40E+04	5.43E+04	5.43E+04	5.42E+04	5.40E+04	5.43E+04	5.40E+04	5.42E+04
	ECD	1.46E+06	1.47E+06	1.47E+06	1.46E+06	1.48E+06	1.48E+06	1.49E+06	1.49E+06
	PID	1.10E+05	1.15E+05	1.76E+05	4.95E+05	1.06E+05	1.11E+05	1.88E+05	5.29E+05
	FID	5.48E+04	5.53E+04	5.67E+04	6.43E+04	5.76E+04	5.81E+04	6.16E+04	7.35E+04
CPT-MIP17-25	XSD	5.40E+04	5.43E+04	5.40E+04	5.42E+04	5.17E+04	5.15E+04	5.17E+04	5.16E+04
	ECD	1.48E+06	1.48E+06	1.49E+06	1.49E+06	1.45E+06	1.45E+06	1.46E+06	1.46E+06
	PID	1.06E+05	1.11E+05	1.88E+05	5.29E+05	1.12E+05	1.19E+05	2.22E+05	1.16E+06
	FID	5.76E+04	5.81E+04	6.16E+04	7.35E+04	5.25E+04	5.33E+04	5.52E+04	9.30E+04

TABLE 1 (continued): Summary of Quality Assurance/Quality Control (QA/QC) Data

MIP Location	Detector	Detector Response (µV)							
		Pre-Log Response				Post-Log Response			
		Baseline	Standard Concentration (Benzene)			Baseline	Standard Concentration (Benzene)		
			1 ppm	10 ppm	100 ppm		1 ppm	10 ppm	100 ppm
CPT-MIP17-26	XSD	2.46E+04	2.46E+04	2.46E+04	2.47E+04	3.22E+04	3.23E+04	3.27E+04	3.25E+04
	ECD	1.40E+06	1.43E+06	1.43E+06	1.42E+06	1.40E+06	1.41E+06	1.42E+06	1.41E+06
	PID	9.95E+04	1.15E+05	2.44E+05	1.20E+06	1.28E+05	1.32E+05	1.99E+05	8.55E+05
	FID	4.17E+04	4.26E+04	4.67E+04	7.93E+04	5.20E+04	5.34E+04	5.61E+04	7.81E+04
CPT-MIP17-27	XSD	3.22E+04	3.23E+04	3.27E+04	3.25E+04	3.43E+04	3.43E+04	3.44E+04	3.43E+04
	ECD	1.40E+06	1.41E+06	1.42E+06	1.41E+06	1.43E+06	1.44E+06	1.44E+06	1.44E+06
	PID	1.28E+05	1.32E+05	1.99E+05	8.55E+05	1.41E+05	1.44E+05	2.28E+05	1.06E+06
	FID	5.20E+04	5.34E+04	5.61E+04	7.81E+04	5.83E+04	5.86E+04	6.14E+04	9.49E+04
CPT-MIP17-28	XSD	3.43E+04	3.43E+04	3.44E+04	3.43E+04	3.64E+04	3.61E+04	3.62E+04	3.61E+04
	ECD	1.43E+06	1.44E+06	1.44E+06	1.44E+06	1.50E+06	1.50E+06	1.50E+06	1.50E+06
	PID	1.41E+05	1.44E+05	2.28E+05	1.06E+06	1.16E+05	1.17E+05	1.60E+05	5.91E+05
	FID	5.83E+04	5.86E+04	6.14E+04	9.49E+04	6.87E+04	6.93E+04	7.05E+04	8.85E+04
CPT-MIP17-29	XSD	3.85E+04	3.83E+04	3.83E+04	3.79E+04	3.84E+04	3.85E+04	3.85E+04	3.87E+04
	ECD	1.37E+06	1.37E+06	1.37E+06	1.36E+06	1.37E+06	1.38E+06	1.37E+06	1.38E+06
	PID	8.07E+04	8.57E+04	1.36E+05	6.28E+05	1.08E+05	1.12E+05	1.53E+05	6.84E+05
	FID	4.27E+04	4.28E+04	4.26E+04	5.99E+04	3.90E+04	3.97E+04	4.14E+04	6.15E+04
CPT-MIP17-30	XSD	3.84E+04	3.85E+04	3.85E+04	3.87E+04	3.90E+04	3.91E+04	3.88E+04	3.84E+04
	ECD	1.37E+06	1.38E+06	1.37E+06	1.38E+06	1.34E+06	1.35E+06	1.35E+06	1.35E+06
	PID	1.08E+05	1.12E+05	1.53E+05	6.84E+05	1.10E+05	1.09E+05	1.63E+05	7.01E+05
	FID	3.90E+04	3.97E+04	4.14E+04	6.15E+04	4.47E+04	4.57E+04	4.73E+04	7.16E+04
CPT-MIP17-32	XSD	2.68E+04	2.67E+04	2.65E+04	2.65E+04	2.76E+04	2.79E+04	2.82E+04	2.86E+04
	ECD	1.30E+06	1.30E+06	1.30E+06	1.30E+06	1.32E+06	1.32E+06	1.33E+06	1.34E+06
	PID	7.85E+04	9.16E+04	1.73E+05	6.43E+05	1.20E+05	1.21E+05	1.91E+05	1.29E+06
	FID	3.69E+04	3.72E+04	3.97E+04	6.19E+04	3.71E+04	3.76E+04	4.00E+04	9.33E+04
CPT-MIP17-33	XSD	2.31E+04	2.31E+04	2.33E+04	2.36E+04	2.54E+04	2.53E+04	2.52E+04	2.53E+04
	ECD	1.25E+06	1.25E+06	1.25E+06	1.24E+06	1.24E+06	1.24E+06	1.24E+06	1.24E+06
	PID	7.31E+04	8.37E+04	1.90E+05	1.31E+06	1.26E+05	1.26E+05	1.79E+05	7.69E+05
	FID	3.17E+04	3.20E+04	3.37E+04	7.80E+04	3.29E+04	3.40E+04	3.49E+04	5.85E+04
CPT-MIP17-34	XSD	2.54E+04	2.53E+04	2.52E+04	2.53E+04	2.52E+04	2.52E+04	2.52E+04	2.55E+04
	ECD	1.24E+06	1.24E+06	1.24E+06	1.24E+06	1.24E+06	1.25E+06	1.26E+06	1.26E+06
	PID	1.26E+05	1.26E+05	1.79E+05	7.69E+05	1.07E+05	1.14E+05	1.97E+05	1.03E+06
	FID	3.29E+04	3.40E+04	3.49E+04	5.85E+04	3.22E+04	3.41E+04	3.60E+04	6.99E+04
CPT-MIP17-35	XSD	2.52E+04	2.52E+04	2.52E+04	2.55E+04	2.70E+04	2.72E+04	2.71E+04	2.69E+04
	ECD	1.24E+06	1.25E+06	1.26E+06	1.26E+06	1.29E+06	1.30E+06	1.29E+06	1.30E+06
	PID	1.07E+05	1.14E+05	1.97E+05	1.03E+06	1.07E+05	1.17E+05	1.95E+05	1.19E+06
	FID	3.22E+04	3.41E+04	3.60E+04	6.99E+04	3.53E+04	3.63E+04	3.98E+04	8.85E+04
CPT-MIP17-36	XSD	2.70E+04	2.72E+04	2.71E+04	2.69E+04	2.68E+04	2.67E+04	2.65E+04	2.65E+04
	ECD	1.29E+06	1.30E+06	1.29E+06	1.30E+06	1.30E+06	1.30E+06	1.30E+06	1.30E+06
	PID	1.07E+05	1.17E+05	1.95E+05	1.19E+06	7.85E+04	9.16E+04	1.73E+05	6.43E+05
	FID	3.53E+04	3.63E+04	3.98E+04	8.85E+04	3.69E+04	3.72E+04	3.97E+04	6.19E+04

Response Test Statistics		Baseline	Standard Concentration (Benzene)			Trend Statistics	
			1 ppm	10 ppm	100 ppm	Equation	R^2
XSD Response	***MIN***	*2.31E+04*	*2.31E+04*	*2.33E+04*	*2.36E+04*	y = 501.18x + 130390	0.2308
	MAX	*6.08E+04*	*6.19E+04*	*6.01E+04*	*6.04E+04*		
	AVG	***4.42E+04***	***4.44E+04***	***4.44E+04***	***4.42E+04***		
ECD Response	***MIN***	*1.24E+06*	*1.24E+06*	*1.24E+06*	*1.24E+06*	y = 0.9776x + 1E+06	2.00E-07
	MAX	*1.61E+06*	*1.65E+06*	*1.60E+06*	*1.61E+06*		
	AVG	***1.42E+06***	***1.43E+06***	***1.43E+06***	***1.43E+06***		
PID Response	***MIN***	*7.31E+04*	*8.37E+04*	*1.36E+05*	*4.72E+05*	y = 7976.1x + 141812	0.7276
	MAX	*3.21E+05*	*3.32E+05*	*6.37E+05*	*2.44E+06*		
	AVG	***1.39E+05***	***1.44E+05***	***2.28E+05***	***9.39E+05***		
FID Response	***MIN***	*3.17E+04*	*3.20E+04*	*3.37E+04*	*4.62E+04*	y = 230.92x + 51108	0.427
	MAX	*7.44E+04*	*7.58E+04*	*7.44E+04*	*1.06E+05*		
	AVG	***5.08E+04***	***5.15E+04***	***5.32E+04***	***7.42E+04***		

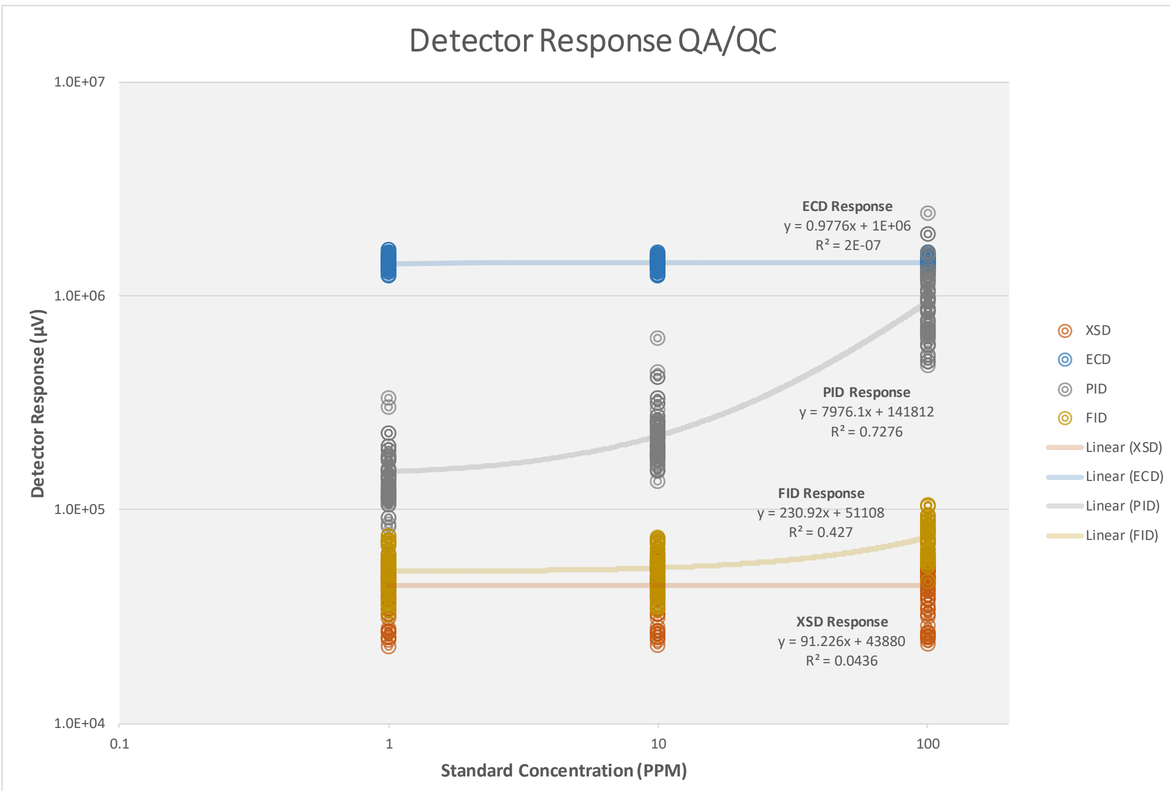

Detector Response QA/QC
1.0E+07
1.0E+06
1.0E+05
1.0E+04
Detector Response (µV)
0.1
1
10
100
Standard Concentration (PPM)
ECD Response
y = 0.9776x + 1E+06
R² = 2E-07
PID Response
y = 7976.1x + 141812
R² = 0.7276
FID Response
y = 230.92x + 51108
R² = 0.427
XSD Response
y = 91.226x + 43880
R² = 0.0436
XSD
ECD
PID
FID
Linear (XSD)
Linear (ECD)
Linear (PID)
Linear (FID)

TABLE 2: Summary of MIP Sensor Data

MIP Location	Detector	Detector Response (µV)		
		Min	Max	Average
CPT-MIP17-01	XSD	5.25E+04	5.81E+04	5.51E+04
	ECD	1.45E+06	1.83E+06	1.49E+06
	PID	2.02E+05	2.44E+05	2.17E+05
	FID	4.96E+04	2.10E+05	5.48E+04
CPT-MIP17-02	XSD	5.61E+04	6.07E+04	5.77E+04
	ECD	1.39E+06	1.72E+06	1.43E+06
	PID	1.46E+05	1.61E+06	3.20E+05
	FID	5.08E+04	1.68E+06	4.22E+05
CPT-MIP17-03	XSD	5.26E+04	6.02E+04	5.49E+04
	ECD	1.36E+06	1.64E+06	1.38E+06
	PID	1.66E+05	3.37E+06	4.55E+05
	FID	5.03E+04	1.04E+06	1.91E+05
CPT-MIP17-04	XSD	4.41E+04	4.97E+04	4.69E+04
	ECD	1.31E+06	1.58E+06	1.33E+06
	PID	1.68E+05	1.40E+07	1.13E+06
	FID	4.46E+04	3.25E+06	6.19E+05
CPT-MIP17-05	XSD	4.66E+04	5.51E+04	4.83E+04
	ECD	1.40E+06	1.67E+06	1.44E+06
	PID	1.81E+05	8.02E+05	3.51E+05
	FID	4.79E+04	8.48E+05	2.59E+05
CPT-MIP17-06	XSD	5.12E+04	5.42E+04	5.25E+04
	ECD	1.43E+06	1.72E+06	1.46E+06
	PID	1.50E+05	1.17E+06	2.69E+05
	FID	4.75E+04	1.34E+06	4.11E+05
CPT-MIP17-07	XSD	5.01E+04	5.81E+04	5.43E+04
	ECD	1.40E+06	1.72E+06	1.46E+06
	PID	1.41E+05	8.26E+06	5.48E+05
	FID	4.97E+04	1.44E+06	1.06E+05
CPT-MIP17-08	XSD	5.33E+04	6.20E+04	5.60E+04
	ECD	1.43E+06	1.78E+06	1.46E+06
	PID	1.49E+05	1.57E+07	6.00E+05
	FID	5.23E+04	2.26E+06	2.14E+05
CPT-MIP17-09	XSD	4.17E+04	4.46E+04	4.23E+04
	ECD	1.30E+06	1.64E+06	1.35E+06
	PID	1.39E+05	2.52E+05	1.88E+05
	FID	4.30E+04	1.80E+05	6.09E+04
CPT-MIP17-10	XSD	4.19E+04	4.54E+04	4.33E+04
	ECD	1.33E+06	1.67E+06	1.36E+06
	PID	1.38E+05	1.80E+06	6.22E+05
	FID	4.84E+04	6.69E+05	1.70E+05
CPT-MIP17-11	XSD	4.59E+04	4.88E+04	4.68E+04
	ECD	1.41E+06	1.72E+06	1.43E+06
	PID	1.60E+05	7.24E+06	1.69E+06
	FID	6.45E+04	2.23E+06	2.86E+05
CPT-MIP17-12	XSD	4.39E+04	4.93E+04	4.63E+04
	ECD	1.45E+06	1.75E+06	1.50E+06
	PID	1.36E+05	2.10E+05	1.53E+05
	FID	5.45E+04	3.92E+05	8.53E+04

TABLE 2 (continued): Summary of MIP Sensor Data

MIP Location	Detector	Detector Response (µV)		
		Min	Max	Average
CPT-MIP17-13	XSD	4.85E+04	5.60E+04	5.17E+04
	ECD	1.57E+06	1.81E+06	1.60E+06
	PID	1.24E+05	1.46E+05	1.31E+05
	FID	6.36E+04	3.46E+05	7.64E+04
CPT-MIP17-14	XSD	3.93E+04	4.73E+04	4.09E+04
	ECD	1.27E+06	1.61E+06	1.32E+06
	PID	1.20E+05	2.51E+06	2.90E+05
	FID	3.71E+04	7.00E+05	7.03E+04
CPT-MIP17-15	XSD	4.32E+04	4.76E+04	4.46E+04
	ECD	1.34E+06	1.69E+06	1.37E+06
	PID	1.27E+05	1.22E+06	2.53E+05
	FID	4.25E+04	1.32E+06	6.44E+04
CPT-MIP17-16	XSD	4.52E+04	5.42E+04	4.79E+04
	ECD	1.39E+06	1.71E+06	1.44E+06
	PID	1.06E+05	7.84E+06	7.17E+05
	FID	4.68E+04	1.26E+06	1.21E+05
CPT-MIP17-17	XSD	4.89E+04	5.42E+04	5.16E+04
	ECD	1.46E+06	1.74E+06	1.49E+06
	PID	1.11E+05	1.25E+07	1.15E+06
	FID	5.94E+04	1.06E+06	2.10E+05
CPT-MIP17-18	XSD	4.02E+04	4.77E+04	4.41E+04
	ECD	1.43E+06	1.68E+06	1.45E+06
	PID	1.58E+05	3.74E+06	4.45E+05
	FID	3.91E+04	2.81E+06	2.90E+05
CPT-MIP17-19	XSD	4.75E+04	5.36E+04	4.93E+04
	ECD	1.45E+06	1.70E+06	1.48E+06
	PID	1.19E+05	9.23E+05	2.64E+05
	FID	4.81E+04	2.26E+06	1.31E+05
CPT-MIP17-20	XSD	4.94E+04	5.87E+04	5.22E+04
	ECD	1.49E+06	1.75E+06	1.55E+06
	PID	1.02E+05	2.83E+06	4.57E+05
	FID	5.81E+04	6.21E+05	9.01E+04
CPT-MIP17-21	XSD	5.13E+04	5.87E+04	5.37E+04
	ECD	1.53E+06	1.80E+06	1.55E+06
	PID	1.86E+05	1.68E+07	9.61E+05
	FID	7.36E+04	3.50E+06	2.88E+05
CPT-MIP17-22	XSD	4.29E+04	4.84E+04	4.50E+04
	ECD	1.32E+06	1.65E+06	1.35E+06
	PID	1.05E+05	6.12E+06	6.70E+05
	FID	3.78E+04	5.40E+05	1.22E+05
CPT-MIP17-23	XSD	4.72E+04	8.63E+04	5.27E+04
	ECD	1.35E+06	1.86E+06	1.44E+06
	PID	8.82E+04	5.00E+06	5.21E+05
	FID	5.12E+04	1.50E+06	1.40E+05
CPT-MIP17-24	XSD	4.83E+04	5.53E+04	5.08E+04
	ECD	1.37E+06	1.69E+06	1.41E+06
	PID	1.06E+05	1.12E+07	5.76E+05
	FID	4.36E+04	1.28E+06	1.03E+05

TABLE 2 (continued): Summary of MIP Sensor Data

MIP Location	Detector	Detector Response (µV)		
		Min	Max	Average
CPT-MIP17-25	XSD	5.04E+04	5.47E+04	5.18E+04
	ECD	1.41E+06	1.68E+06	1.44E+06
	PID	8.87E+04	9.36E+06	6.08E+05
	FID	5.08E+04	1.36E+06	1.10E+05
CPT-MIP17-26	XSD	2.68E+04	8.42E+04	3.16E+04
	ECD	1.35E+06	1.72E+06	1.40E+06
	PID	9.96E+04	2.70E+07	2.85E+06
	FID	4.20E+04	2.84E+06	3.42E+05
CPT-MIP17-27	XSD	3.02E+04	8.52E+04	3.83E+04
	ECD	1.36E+06	1.68E+06	1.42E+06
	PID	1.14E+05	2.44E+07	3.18E+06
	FID	4.56E+04	3.09E+06	5.38E+05
CPT-MIP17-28	XSD	3.19E+04	6.95E+04	3.64E+04
	ECD	1.40E+06	1.65E+06	1.43E+06
	PID	1.26E+05	2.22E+07	1.63E+06
	FID	6.09E+04	2.94E+06	4.71E+05
CPT-MIP17-29	XSD	3.56E+04	8.16E+04	3.95E+04
	ECD	1.30E+06	1.65E+06	1.34E+06
	PID	7.74E+04	2.00E+07	1.53E+06
	FID	3.98E+04	2.44E+06	3.42E+05
CPT-MIP17-30	XSD	3.43E+04	9.09E+04	4.05E+04
	ECD	1.32E+06	1.70E+06	1.36E+06
	PID	9.81E+04	2.07E+07	1.48E+06
	FID	4.17E+04	5.00E+06	2.78E+05
CPT-MIP17-32	XSD	2.64E+04	3.11E+04	2.89E+04
	ECD	1.32E+06	1.63E+06	1.36E+06
	PID	7.59E+04	6.74E+06	9.86E+05
	FID	3.54E+04	1.23E+06	1.73E+05
CPT-MIP17-33	XSD	2.27E+04	2.49E+04	2.35E+04
	ECD	1.21E+06	1.62E+06	1.25E+06
	PID	6.36E+04	4.90E+06	9.22E+05
	FID	2.65E+04	8.58E+05	1.62E+05
CPT-MIP17-34	XSD	2.47E+04	2.80E+04	2.62E+04
	ECD	1.23E+06	1.64E+06	1.33E+06
	PID	8.84E+04	1.39E+06	3.38E+05
	FID	2.96E+04	1.32E+05	4.97E+04
CPT-MIP17-35	XSD	2.58E+04	2.94E+04	2.71E+04
	ECD	1.24E+06	1.67E+06	1.26E+06
	PID	8.54E+04	2.68E+07	2.47E+06
	FID	3.56E+04	2.17E+06	8.82E+05
CPT-MIP17-36	XSD	2.56E+04	2.82E+04	2.67E+04
	ECD	1.25E+06	1.63E+06	1.32E+06
	PID	8.42E+04	1.16E+05	9.36E+04
	FID	3.27E+04	2.57E+05	5.32E+04

MIP Statistics	Min	Max	Average
XSD Response	*2.27E+04*	*9.09E+04*	*4.46E+04*
ECD Response	*1.21E+06*	*1.86E+06*	*1.41E+06*
PID Response	*6.36E+04*	*2.70E+07*	*8.30E+05*
FID Response	*2.65E+04*	*5.00E+06*	*2.28E+05*

FIGURES

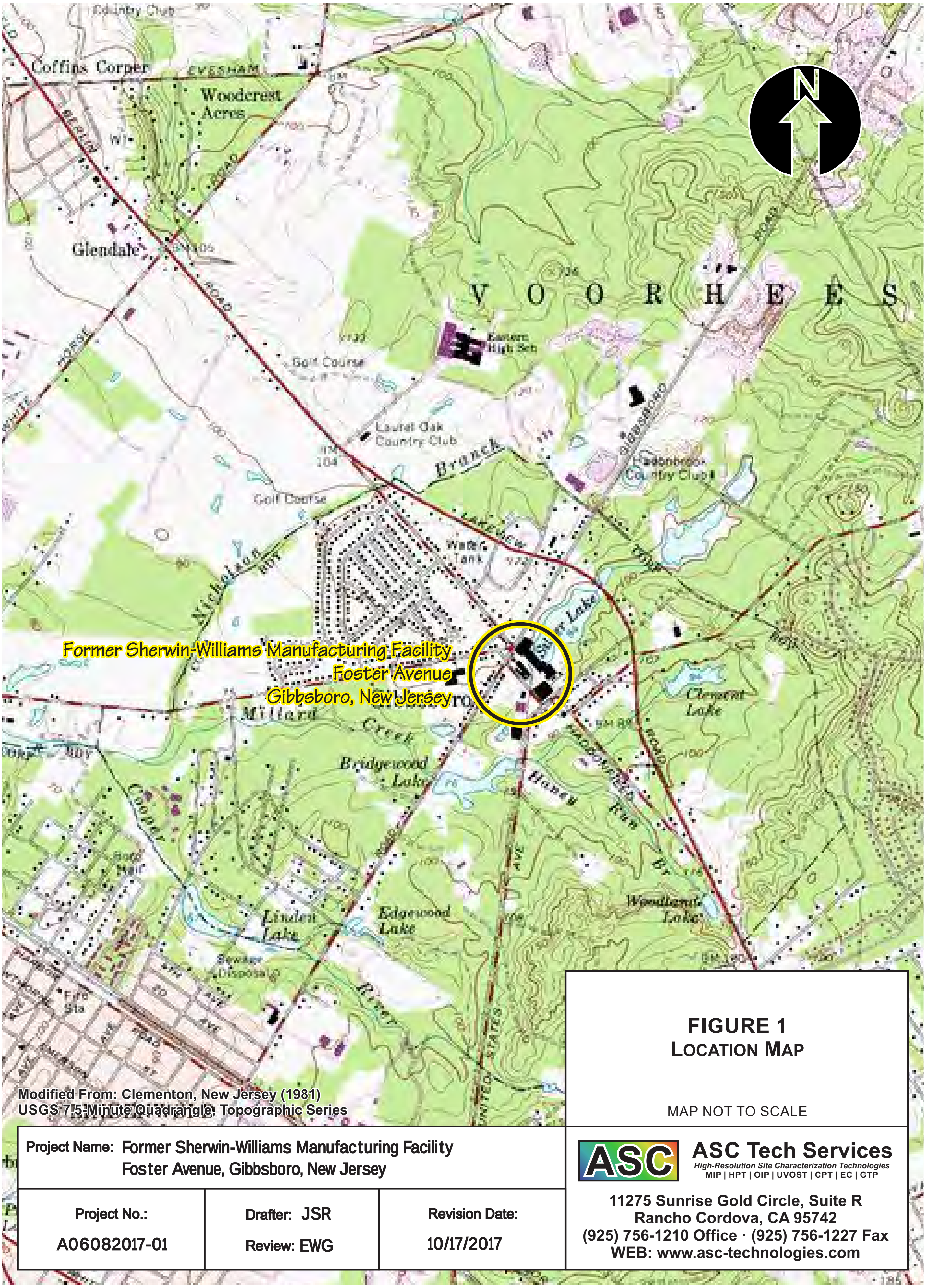
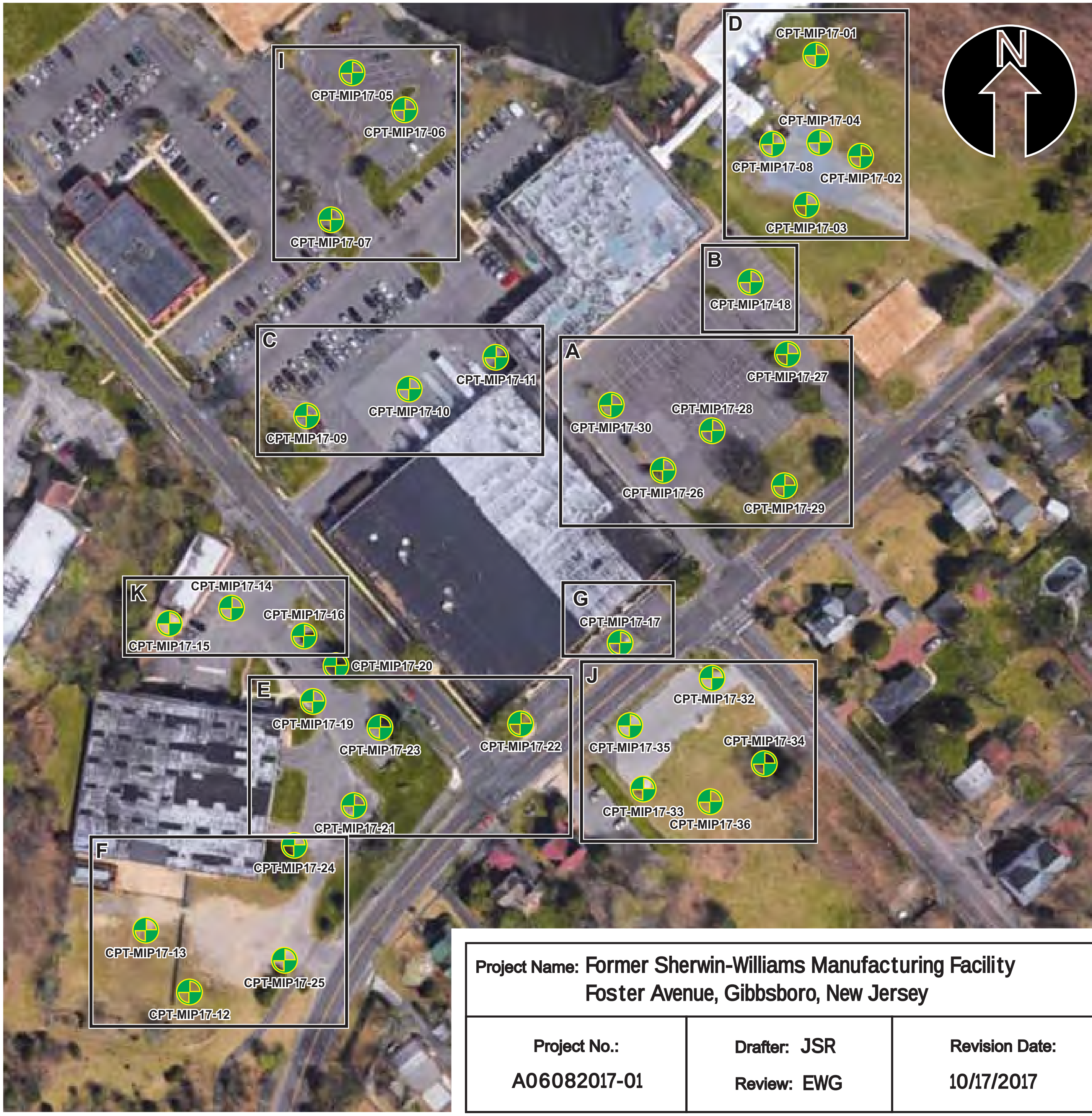


FIGURE 1
LOCATION MAP

MAP NOT TO SCALE

Project Name: Former Sherwin-Williams Manufacturing Facility, Foster Avenue, Gibbsboro, New Jersey		
Project No.: A06082017-01	Drafter: JSR Review: EWG	Revision Date: 10/17/2017

ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | OIP | UVOST | CPT | EC | GTP
11275 Sunrise Gold Circle, Suite R
Rancho Cordova, CA 95742
(925) 756-1210 Office · (925) 756-1227 Fax
WEB: www.asc-technologies.com



EXPLANATION

MIP Push Location (CPT-MIP17-05)

B — EHS Support Area of Concern

FIGURE 2
SITE PLAN

MAP NOT TO SCALE

Project Name: Former Sherwin-Williams Manufacturing Facility
Foster Avenue, Gibbsboro, New Jersey

Project No.:	Drafter: JSR	Revision Date:
A06082017-01	Review: EWG	10/17/2017

ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | OIP | UVOST | CPT | EC | GTP
11275 Sunrise Gold Circle, Suite R
Rancho Cordova, CA 95742
(925) 756-1210 Office · (925) 756-1227 Fax
WEB: www.asc-technologies.com

APPENDIX A
FIELD DATA SHEETS

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	**Sherwin-Williams Manufacturing Plant**
Location Name:	**CPT-MIP17-01**
Date/Time:	**9/19/17**
MIP Operator:	**Jaime S. Ricci**
MIP Contractor:	**ASC Tech Services**

MIP QA/QC DATA

	PRE	POST
XSD	5.30e4	5.72e4
ECD	1.78e6	1.49e6
PID	1.99e5	2.20e5
FID	4.83e4	5.35e4

	PRE	POST
Flow	35.2	34.9
psi	12.0	12.3

INSTRUMENT INFORMATION

Detectors Used:	**XSD / ECD / PID / FID**
Probe Type:	**MP6520/MP4520/MH6530**
Probe S/N	**P=23550, F=A105**
HPT Sensor ID	**N/A**

HPT Reference

LOGGING INFORMATION

MIP File Name:	**CPT-MIP17-01**
Final Depth of Penetration:	**30.05'**
Pre-Log Response Test File Name:	***.pre.tim**
Response Test Compound:	**Benzene**
Trip Time (seconds):	**73**
Post Log Response Test File Name:	***.post.tim**
Response Test Compound:	**Benzene**
Trip Time (seconds):	**74**

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.17e4	5.32e4	5.29e4	5.29e4	
ECD	1.49e6	1.51e6	1.52e6	1.52e6	
PID	3.21e5	3.32e5	6.37e5	2.44e6	
FID	5.15e4	5.27e4	5.88e4	1.04e5	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	6.07e4	6.19e4	6.01e4	6.04e4	
ECD	1.52e6	1.65e6	1.56e6	1.55e6	
PID	1.59e5	1.77e5	4.16e5	1.94e6	
FID	6.01e4	5.96e4	6.54e4	1.04e5	

OBSERVATIONS

0.00 Start Push **11:48**

Remove data from 2.95 - 3.10 feet. The clamp came down without moving the rod

30.05 End Push **12:36**

4409733.8 Northing **39.83760 N**

503230.4 Easting **74.96224 W**

Elevation 35.00 m **114.83 feet**

Zone 18

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-02
Date/Time:	9/19/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-02
Final Depth of Penetration:	26.10
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

MIP QA/QC DATA

	PRE	POST
XSD	5.55e4	5.78e4
ECD	1.76e6	1.44e6
PID	1.31e5	1.72e5
FID	4.84e4	5.13e4
	PRE	POST
Flow	34.7	34.7
psi	12.0	12.3

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	6.08e4	6.19e4	6.01e4	6.01e4	
ECD	1.54e6	1.65e6	1.56e6	1.55e6	
PID	1.59e5	1.77e5	4.16e5	1.94e6	
FID	5.97e4	6.07e4	6.54e4	1.04e5	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.67e4	5.73e4	5.70e4	5.64e4	
ECD	1.42e6	1.46e6	1.45e6	1.46e6	
PID	1.85e5	1.91e5	3.35e5	1.55e6	
FID	5.46e4	5.42e4	5.72e4	8.08e4	

OBSERVATIONS

0.00	Start Push	13:53
26.10	End Push	14:28

Post response completed when detectors had stabilized. XSD, ECD, and FID were near pre-response levels. PID was slightly higher than pre-response levels. I discussed with EHS, and they were ok with detector stability.

39.83737 N

74.96211 W

Elevation 116 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-03
Date/Time:	9/19/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-03
Final Depth of Penetration:	31.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74

MIP QA/QC DATA

	PRE	POST
XSD	5.87e4	5.28e4
ECD	1.64e6	1.37e6
PID	1.26e5	2.06e5
FID	5.30e4	5.36e4
	PRE	POST
Flow	34.5	34.6
psi	12.0	12.2

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.67e4	5.73e4	5.70e4	5.64e4	
ECD	1.42e6	1.46e6	1.45e6	1.46e6	
PID	1.85e5	1.91e5	3.35e5	1.55e6	
FID	5.46e4	5.42e4	5.72e4	8.08e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.89e4	5.90e4	5.87e4	5.86e4	
ECD	1.40e6	1.40e6	1.42e6	1.43e6	
PID	3.07e5	3.09e5	4.43e5	1.59e6	
FID	5.23e4	5.25e4	5.41e4	7.83e4	

OBSERVATIONS

0.00 Start Push 15:41

31.05 End Push 16:21

Post response completed when detectors had stabilized. XSD, ECD, and FID were near pre-response levels. PID was higher than pre-response levels. I discussed with EHS, and they were ok with detector stability.

39.83725 N

74.96231 W

Elevation 116 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name: Sherwin-Williams Manufacturing Plant
Location Name: CPT-MIP17-04
Date/Time: 9/20/17
MIP Operator: Jaime S. Ricci
MIP Contractor: ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used: XSD / ECD / PID / FID
Probe Type: MP6520/MP4520/MH6530
Probe S/N: P=23550, F=A105
HPT Sensor ID: N/A

LOGGING INFORMATION

MIP File Name: CPT-MIP17-04
Final Depth of Penetration: 30.05

Pre-Log Response Test File Name: *.pre.tim
Response Test Compound: Benzene
Trip Time (seconds): 76

Post Log Response Test File Name: *.post.tim
Response Test Compound: Benzene
Trip Time (seconds): 75

MIP QA/QC DATA

	PRE	POST
XSD	4.34e4	4.61e4
ECD	1.57e6	1.33e6
PID	1.33e5	3.72e5
FID	3.83e4	4.48e4

	PRE	POST
Flow	35.7	35.6
psi	12.0	12.3

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.34e4	4.36e4	4.36e4	4.39e4	
ECD	1.34e6	1.36e6	1.36e6	1.36e6	
PID	1.76e5	1.79e5	2.44e5	9.79e5	
FID	4.34e4	4.34e4	4.50e4	5.63e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.73e4	4.74e4	4.87e4	4.76e4	
ECD	1.39e6	1.43e6	1.43e6	1.43e6	
PID	1.92e5	1.98e5	3.13e5	1.17e6	
FID	5.23e4	5.28e4	5.43e4	6.88e4	

OBSERVATIONS

0.00 Start Push 08:59

30.05 End Push 09:36

PID Gain and Attenuation up to 10 and Medium at 10'.

PID Attenuation and Gain down to High and 1 at 14'.

39.83737 N
74.96229 W
Elevation 108 feet
Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-05
Date/Time:	9/20/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-05
Final Depth of Penetration:	17.95
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

MIP QA/QC DATA

	PRE	POST
XSD	4.69e4	4.82e4
ECD	1.70e6	1.43e6
PID	1.87e5	1.93e5
FID	5.02e4	5.81e4
	PRE	POST
Flow	35.0	35.0
psi	12.3	12.5

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.73e4	4.74e4	4.87e4	4.76e4	
ECD	1.39e6	1.43e6	1.43e6	1.43e6	
PID	1.92e5	1.98e5	3.13e5	1.17e6	
FID	5.23e4	5.28e4	5.43e4	6.98e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.86e4	4.86e4	4.90e4	4.90e4	
ECD	1.47e6	1.51e6	1.50e6	1.50e6	
PID	1.65e5	1.71e5	2.58e5	9.45e5	
FID	5.33e4	5.53e4	5.63e4	7.03e4	

OBSERVATIONS

0.00	Start Push	11:03
17.95	End Push	11:25

39.83756 N

74.96376 W

Elevation 88 feet

Accuracy = 11 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-06
Date/Time:	9/20/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-06
Final Depth of Penetration:	15.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

MIP QA/QC DATA

	PRE	POST
XSD	4.80e4	5.30e4
ECD	1.69e6	1.45e6
PID	1.43e5	1.75e5
FID	5.15e4	5.17e4
	PRE	POST
Flow	34.8	34.9
psi	12.3	12.6

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.86e4	4.86e4	4.90e4	4.90e4	
ECD	1.47e6	1.51e6	1.50e6	1.50e6	
PID	1.65e5	1.71e5	2.58e5	9.45e5	
FID	5.33e4	5.53e4	5.63e4	7.03e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.21e4	5.24e4	5.20e4	5.16e4	
ECD	1.48e6	1.48e6	1.48e6	1.47e6	
PID	1.48e5	1.52e5	2.17e5	9.80e5	
FID	5.07e4	5.16e4	5.14e4	6.52e4	

OBSERVATIONS

0.00 Start Push 12:11

15.05 End Push 12:31

39.83746 N

74.96357 W

Elevation 80 feet

Accuracy = 9 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-07
Date/Time:	9/20/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-07
Final Depth of Penetration:	32.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	76

MIP QA/QC DATA

	PRE	POST
XSD	5.21e4	5.69e4
ECD	1.73e6	1.47e6
PID	1.42e5	2.73e5
FID	5.24e4	6.23e4

	PRE	POST
Flow	34.7	34.6
psi	12.4	12.5

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.21e4	5.24e4	5.20e4	5.16e4	
ECD	1.48e6	1.48e6	1.48e6	1.47e6	
PID	1.48e5	1.52e5	2.17e5	9.80e5	
FID	5.07e4	5.16e4	5.14e4	6.58e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.37e4	5.38e4	5.34e4	5.34e4	
ECD	1.44e6	1.46e6	1.45e6	1.45e6	
PID	2.40e5	2.29e5	2.74e5	8.72e5	
FID	5.59e4	5.67e4	5.59e4	6.58e4	

OBSERVATIONS

0.00 Start Push 13:31

PID Gain and Attenuation to Medium and 10 at 6 feet.

PID Attenuation and Gain to High and 1 at 9 feet.

32.00 End Push 14:27

39.83718 N

74.96381 W

Elevation 108 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-08
Date/Time:	9/20/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

MIP QA/QC DATA

	PRE	POST
XSD	6.35e4	5.48e4
ECD	1.84e6	1.46e6
PID	1.64e5	2.58e5
FID	7.58e4	5.64e4
	PRE	POST
Flow	34.6	34.1
psi	12.2	12.4

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

HPT Reference

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-08
Final Depth of Penetration:	33.95
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	76
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	77

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.37e4	5.38e4	5.34e4	5.34e4	
ECD	1.44e6	1.46e6	1.45e6	1.45e6	
PID	2.40e5	2.29e5	2.74e5	8.72e5	
FID	5.59e4	5.67e4	5.59e4	6.58e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.70e4	5.72e4	5.79e4	5.75e4	
ECD	1.51e6	1.52e6	1.52e6	1.51e6	
PID	1.72e5	1.72e5	2.33e5	7.65e5	
FID	7.10e4	7.27e4	7.11e4	8.43e4	

OBSERVATIONS

0.00	Start Push	15:24
33.95	End Push	16:03

39.83731 N

74.96237 W

Elevation 120 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-09
Date/Time:	9/21/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-09
Final Depth of Penetration:	11.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73

MIP QA/QC DATA

	PRE	POST
XSD	4.22e4	4.18e4
ECD	1.66e6	1.32e6
PID	1.40e5	1.67e5
FID	4.44e4	4.81e4

	PRE	POST
Flow	37.8	37.3
psi	12.5	12.7

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.95e4	3.96e4	3.99e4	4.00e4	
ECD	1.33e6	1.33e6	1.34e6	1.3~~4~~e6	
PID	1.42e5	1.46e5	2.43e5	7.26e5	
FID	4.29e4	4.40e4	4.36e4	5.50e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.24e4	4.25e4	4.22e4	4.21e4	
ECD	1.34e6	1.34e6	1.34e6	1.34e6	
PID	1.40e5	1.51e5	2.20e5	8.35e5	
FID	4.69e4	4.61e4	4.80e4	6.19e4	

OBSERVATIONS

0.00 Start Push 08:50

11.00 End Push 09:10

39.83663 N

74.96393 W

Elevation 157 feet

Accuracy = 10 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-10
Date/Time:	9/21/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-10
Final Depth of Penetration:	13.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73

MIP QA/QC DATA

	PRE	POST
XSD	4.18e4	4.29e4
ECD	1.67e6	1.37e6
PID	1.33e5	1.53e8
FID	4.71e4	5.30e4

	PRE	POST
Flow	36 8	36.5
psi	12.5	12.7

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.24e4	4.25e4	4.22e4	4.21e4	
ECD	1.34e6	1.34e6	1.34e6	1.34e6	
PID	1.40e5	1.51e5	2.20e5	8.35e5	
FID	4.69e4	4.61e4	4.80e4	6.19e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.48e4	4.42e4	4.56e4	4.50e4	
ECD	1.40e6	1.40e6	1.40e6	1.41e6	
PID	1.48e5	1.54e5	2.34e5	8.59e5	
FID	5.46e4	5.55e4	5.70e4	6.28e4	

OBSERVATIONS

0.00	Start Push	09:54
13.00	End Push	10:27

39.83679 N

74.96359 W

Elevation 103 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name: Sherwin-Williams Manufacturing Plant

Location Name: CPT-MIP17-11

Date/Time: 9/21/17

MIP Operator: Jaime S. Ricci

MIP Contractor: ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used: XSD / ECD / PID / FID

Probe Type: MP6520/MP4520/MH6530

Probe S/N: P=23550, F=A105

HPT Sensor ID: N/A

LOGGING INFORMATION

MIP File Name: CPT-MIP17-11

Final Depth of Penetration: 19.00

Pre-Log Response Test File Name: *.pre.tim

Response Test Compound: Benzene

Trip Time (seconds): 73

Post Log Response Test File Name: *.post.tim

Response Test Compound: Benzene

Trip Time (seconds):

MIP QA/QC DATA

	PRE	POST
XSD	4.66e4	4.60e4
ECD	1.74e6	1.43e6
PID	1.34e5	4.31e5
FID	5.67e4	6.63e4
	PRE	POST
Flow	36.1	36.0
psi	12.5	12.8

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.48e4	4.49e4	4.56e4	4.50e4	
ECD	1.40e6	1.40e6	1.40e6	1.41e6	
PID	1.48e5	1.54e5	2.34e5	8.59e5	
FID	5.46e4	5.55e4	5.70e4	6.98e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.34e4	5.36e4	5.35e4	5.32e4	
ECD	1.53e6	1.54e6	1.54e6	1.55e6	
PID	1.54e5	1.57e5	1.99e5	5.84e5	
FID	7.13e4	7.13e4	7.23e4	8.16e4	

OBSERVATIONS

0.00 Start Push 11:03

PID Gain and Attenuation to Medium and 10 at 5.95'

PID Attenuation and Gain to High and 1 at '

19.00 **End Push** 11:30

39.83675 N

74.96336 W

Elevation 134 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-12
Date/Time:	9/21/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-12
Final Depth of Penetration:	39.95
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	4.97e4	4.71e4
ECD	1.76e6	1.53e6
PID	1.22e5	1.54e5
FID	6.44e4	6.06e4
	PRE	POST
Flow	35.6	35.7
psi	12.5	13.1

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.17e4	5.22e4	5.24e4	5.22e4	
ECD	1.54e6	1.55e6	1.55e6	1.56e6	
PID	1.33e5	1.39e4	1.78e5	5.12e5	
FID	7.25e4	7.16e4	7.48e4	8.14e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.61e4	4.59e4	4.72e4	4.69e4	
ECD	1.52e6	1.52e6	1.54e6	1.54e6	
PID	1.31e5	1.37e5	1.97e5	8.53e5	
FID	5.24e4	5.34e4	5.58e4	7.33e4	

OBSERVATIONS

0.00	Start Push	13:11
39.95	End Push	13:58

39.83526 N

74.96427 W

Elevation 68 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-13
Date/Time:	9/21/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-13
Final Depth of Penetration:	40.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	4.72e4	5.33e4
ECD	1.82e6	1.61e6
PID	1.24e5	1.32e5
FID	6.40e4	7.87e4
	PRE	POST
Flow	35.5	35.6
psi	12.8	13.0

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.61e4	4.59e4	4.72e4	4.69e4	
ECD	1.52e6	1.52e6	1.54e6	1.54e6	
PID	1.31e5	1.37e5	1.97e5	8.53e5	
FID	5.24e4	5.34e4	5.58e4	7.33e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.20e4	5.22e4	5.13e4	5.11e4	
ECD	1.57e6	1.57e6	1.57e6	1.57e6	
PID	1.16e5	1.22e5	1.80e5	1.25e6	
FID	7.15e4	7.20e4	7.30e4	1.06e5	

OBSERVATIONS

0.00 Start Push 14:55

40.00 End Push 15:52

39.83542 N

74.96444 W

Elevation 123 feet

Accuracy = 9 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-14
Date/Time:	9/22/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-14
Final Depth of Penetration:	40.90
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73

MIP QA/QC DATA

	PRE	POST
XSD	3.89e4	4.18e4
ECD	1.63e6	1.35e6
PID	1.11e5	1.83e5
FID	3.43e4	4.23e4
	PRE	POST
Flow	38.1	37.6
psi	12.5	12.9

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.06e4	4.07e4	4.07e4	4.00e4	
ECD	1.34e6	1.34e6	1.33e6	1.33e6	
PID	1.32e5	1.39e5	2.41e5	1.13e6	
FID	3.52e4	3.60e4	3.72e4	5.48e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.50e4	4.51e4	4.52e4	4.53e4	
ECD	1.39e6	1.39e6	1.40e6	1.40e6	
PID	1.37e5	1.41e5	1.84e5	6.98e5	
FID	4.56e4	4.57e4	4.69e4	5.82e4	

OBSERVATIONS

0.00	Start Push	08:43
40.90	End Push. Refusal.	09:33

39.83622 N
74.96414 W
Elevation 103 feet
Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-15
Date/Time:	9/22/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-15
Final Depth of Penetration:	43.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	

MIP QA/QC DATA

	PRE	POST
XSD	4.68e4	4.47e4
ECD	1.74e6	1.39e6
PID	1.25e5	1.65e5
FID	4.54e4	4.59e4

	PRE	POST
Flow	37.1	36.6
psi	12.6	12.8

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.50e4	4.51e4	4.52e4	4.53e4	
ECD	1.39e6	1.39e6	1.40e6	1.40e6	
PID	1.37e5	1.41e5	1.84e5	6.98e5	
FID	4.56e4	4.57e4	4.69e4	5.82e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.68e4	4.71e4	4.68e4	4.65e4	
ECD	1.42e6	1.42e6	1.42e6	1.42e6	
PID	1.21e5	1.40e5	2.58e5	1.36e6	
FID	4.86e4	4.98e4	5.23e4	8.02e4	

OBSERVATIONS

0.00 Start Push 10:39

43.05 End Push 11:30

39.83603 N

74.96447 W

Elevation 154 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-16
Date/Time:	9/22/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-16
Final Depth of Penetration:	44.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73

MIP QA/QC DATA

	PRE	POST
XSD	4.41e4	4.73e4
ECD	1.69e6	1.48e6
PID	1.08e5	2.33e5
FID	4.36e4	5.58e4
	PRE	POST
Flow	36.5	36.1
psi	12.7	12.9

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.54e4	4.56e4	4.55e4	4.56e4	
ECD	1.39e6	1.40e6	1.40e6	1.40e6	
PID	1.07e5	1.24e5	2.09e5	1.26e6	
FID	4.74e4	4.67e4	4.96e4	7.60e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.86e4	4.89e4	4.82e4	4.78e4	
ECD	1.48e6	1.48e6	1.48e6	1.47e6	
PID	1.13e5	1.22e5	2.05e5	7.48e5	
FID	5.57e4	5.57e4	5.84e4	7.30e4	

OBSERVATIONS

0.00 Start Push 13:07

PID Gain and Attenuation to Medium and 10 at 3.95'

PID Attenuation and Gain to 1 and High at 7.95'

40.05 End Push. Refusal. 14:03

39.83611 N

74.96402 W

Elevation 90 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	**Sherwin-Williams Manufacturing Plant**
Location Name:	**CPT-MIP17-17**
Date/Time:	**9/22/17**
MIP Operator:	**Jaime S. Ricci**
MIP Contractor:	**ASC Tech Services**

INSTRUMENT INFORMATION

Detectors Used:	**XSD / ECD / PID / FID**
Probe Type:	**MP6520/MP4520/MH6530**
Probe S/N	**P=23550, F=A105**
HPT Sensor ID	**N/A**

LOGGING INFORMATION

MIP File Name:	**CPT-MIP17-17**
Final Depth of Penetration:	~~[illegible]~~ 25.05
Pre-Log Response Test File Name:	***.pre.tim**
Response Test Compound:	**Benzene**
Trip Time (seconds):	**73**
Post Log Response Test File Name:	***.post.tim**
Response Test Compound:	**Benzene**
Trip Time (seconds):	

MIP QA/QC DATA

	PRE	POST
XSD	4.91e4	5.11e4
ECD	1.77e6	1.46e6
PID	1.15e5	6.99e5
FID	5.80e4	8.24e4
	PRE	**POST**
Flow	36.0	35.9
psi	12.7	12.9

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.86e4	4.89e4	4.82e4	4.78e4	
ECD	1.48e6	1.48e6	1.48e4	1.47e6	
PID	1.13e5	1.22e5	2.05e5	7.48e5	
FID	5.57e4	5.57e4	5.84e4	7.30e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.10e4	5.12e4	5.14e4	5.16e4	
ECD	1.48e6	1.48e6	1.48e6	1.49e6	
PID	1.70e5	1.72e5	2.61e5	9.48e5	
FID	5.95e4	6.09e4	6.29e4	8.32e4	

OBSERVATIONS

0.00 Start Push **14:52**

PID Gain and Attenuation to Medium and 10 at 16.00'

PID Attenuation and Gain to 1 and High at 21.00'

25.05

~~25.00~~ **End Push.** **15:30**

Post-response tests completed when detectors had stabilized.
The XSD and ECD were at pre-response levels, the FID and PID
were slightly higher than pre-response levels.

39.83612 N

74.96284 W

Elevation 108 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-18
Date/Time:	9/25/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-18
Final Depth of Penetration:	17.95
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71

MIP QA/QC DATA

	PRE	POST
XSD	3.91e4	4.62e4
ECD	1.71e6	1.43e6
PID	1.74e5	1.90e5
FID	3.85e4	4.19e4
	PRE	POST
Flow	38.6	38.1
psi	12.6	12.9

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.06e4	3.10e4	3.12e4	3.14e4	
ECD	1.50e6	1.50e6	1.50e6	1.50e6	
PID	1.46e5	1.51e5	2.54e5	1.07e6	
FID	3.72e4	3.76e4	3.93e4	6.24e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.83e4	4.86e4	4.89e4	4.90e4	
ECD	1.43e6	1.43e6	1.44e6	1.44e6	
PID	1.44e5	1.51e5	2.52e5	9.64e5	
FID	4.60e4	4.66e4	4.85e4	6.96e4	

OBSERVATIONS

0.00 Start Push 08:39

17.95 End Push. 09:03

39.83697 N

74.96255 W

Elevation 164 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-19
Date/Time:	9/25/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-19
Final Depth of Penetration:	40.30
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	4.78e4	5.06e4
ECD	1.72e6	1.52e6
PID	1.20e5	4.97e5
FID	5.08e4	7.50e4
	PRE	POST
Flow	37.5	36.8
psi	12.7	12.9

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.83e4	4.86e4	4.87e4	4.90e4	
ECD	1.43e6	1.43e6	1.44e6	1.44e6	
PID	1.44e5	1.51e5	2.52e5	9.64e5	
FID	4.60e4	4.66e4	4.85e4	6.96e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.31e4	5.36e4	5.35e4	5.32e4	
ECD	1.54e6	1.54e6	1.54e6	1.54e6	
PID	1.07e5	1.12e5	1.72e5	6.64e5	
FID	6.67e4	6.84e4	6.94e4	8.44e4	

OBSERVATIONS

0.00 Start Push 09:53

40.30 End Push. Refusal. 10:48

39.83597 N

74.96393 W

Elevation 82 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-20
Date/Time:	9/25/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-20
Final Depth of Penetration:	42.65
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71

MIP QA/QC DATA

	PRE	POST
XSD	5.01e4	5.61e4
ECD	1.76e6	1.64e6
PID	1.07e5	2.70e5
FID	6.31e4	6.43e4

	PRE	POST
Flow	36.2	36.0
psi	12.8	13.1

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.01e4	5.07e4	5.07e4	5.07e4	
ECD	1.48e6	1.49e6	1.49e6	1.50e6	
PID	9.83e4	1.05e5	1.66e5	7.19e5	
FID	6.65e4	6.76e4	6.93e4	8.74e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.53e4	5.56e4	5.52e4	5.45e4	
ECD	1.61e6	1.61e6	1.60e6	1.61e6	
PID	1.35e5	1.41e5	1.88e5	5.90e5	
FID	7.44e4	7.58e4	7.37e4	8.98e4	

OBSERVATIONS

0.00 Start Push 12:40

42.65 End Push. Refusal. 13:33

39.83604 N

74.96382 W

Elevation 85 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-21
Date/Time:	9/25/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-21
Final Depth of Penetration:	42.55
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71

MIP QA/QC DATA

	PRE	POST
XSD	5.15e4	5.49e4
ECD	1.76e6	1.55e6
PID	9.84e4	4.29e5
FID	6.78e4	9.11e4
	PRE	POST
Flow	35.9	35.9
psi	12.7	13.1

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.53e4	5.56e4	5.52e4	5.45e4	
ECD	1.61e6	1.61e6	1.60e6	1.61e6	
PID	1.35e5	1.41e5	1.88e5	5.90e5	
FID	7.44e4	7.58e4	7.37e4	8.98e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.40e4	5.46e4	5.54e4	5.58e4	
ECD	1.56e6	1.56e6	1.57e6	1.58e6	
PID	1.26e5	1.29e5	1.79e5	6.60e5	
FID	6.89e4	7.06e4	7.06e4	9.07e4	

OBSERVATIONS

0.00 Start Push 14:41

PID Gain and Attenuation to Medium and 10 at 4.95'

PID Attenuation and Gain to 1 and High at 9.00'

42.55 End Push. Refusal. 15:34

39.83572 N

74.96375 W

Elevation 95 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-22
Date/Time:	9/26/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-22
Final Depth of Penetration:	40.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	76

MIP QA/QC DATA

	PRE	POST
XSD	4.25e4	4.66e4
ECD	1.67e6	1.34e6
PID	1.60e5	1.88e5
FID	3.72e4	4.48e4
	PRE	POST
Flow	36.4	36.0
psi	12.2	12.4

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.18e4	4.21e4	4.23e4	4.23e4	
ECD	1.38e6	1.38e6	1.36e6	1.37e6	
PID	1.64e5	1.74e5	2.05e5	4.72e5	
FID	4.17e4	4.24e4	4.26e4	4.62e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.78e4	4.78e4	4.78e4	4.80e4	
ECD	1.35e6	1.36e6	1.36e6	1.36e6	
PID	9.86e4	1.05e5	1.53e5	5.92e5	
FID	4.40e4	4.52e4	4.54e4	5.73e4	

OBSERVATIONS

0.00 Start Push **09:01**

PID Gain and Attenuation to Medium and 10 at 12.95'

PID Attenuation and Gain to 1 and High at 18.95'

40.00 End Push. **09:50**

39.83594 N

74.96317 W

Elevation 112 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-23
Date/Time:	9/26/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-23
Final Depth of Penetration:	52.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	76
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

MIP QA/QC DATA

	PRE	POST
XSD	4.76e4	6.01e4
ECD	1.68e6	1.48e6
PID	8.76e4	1.43e5
FID	4.58e4	5.32e4
	PRE	POST
Flow	35.8	35.3
psi	12.2	12.4

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	4.78e4	4.78e4	4.78e4	4.80e4	
ECD	1.35e6	1.36e6	1.36e6	1.36e6	
PID	9.86e4	1.05e5	1.53e5	5.94e5	
FID	4.40e4	4.52e4	4.54e4	5.73e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.40e4	5.43e4	5.43e4	5.42e4	
ECD	1.46e6	1.47e6	1.47e6	1.46e6	
PID	1.10e5	1.15e5	1.76e5	4.95e5	
FID	5.48e4	5.53e4	5.67e4	6.43e4	

OBSERVATIONS

0.00 Start Push 10:56

52.05 End Push. 12:05

39.83593 N

74.96366 W

Elevation 89 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-24
Date/Time:	9/26/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-24
Final Depth of Penetration:	45.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74

MIP QA/QC DATA

	PRE	POST
XSD	4.83e4	5.13e4
ECD	1.66e6	1.41e6
PID	7.57e4	2.48e5
FID	4.51e4	6.14e4
	PRE	POST
Flow	35.1	35.1
psi	12.0	12.0

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.40e4	5.43e4	5.43e4	5.42e4	
ECD	1.46e6	1.47e6	1.47e6	1.46e6	
PID	1.10e5	1.15e5	1.76e5	4.95e5	
FID	5.48e4	5.53e4	5.67e4	6.43e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.40e4	5.43e4	5.40e4	5.42e4	
ECD	1.48e6	1.48e6	1.49e6	1.49e6	
PID	1.06e5	1.11e5	1.88e5	5.89e5	
FID	5.76e4	5.81e4	6.16e4	7.35e4	

OBSERVATIONS

0.00 Start Push 13:26

PID Gain and Attenuation to Medium and 10 at 3.95'

PID Attenuation and Gain to 1 and High at 13.90'

45.05 End Push. Refusal. 14:21

39.83576 N

74.96381 W

Elevation 134 feet

Accuracy = 5 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-25
Date/Time:	9/26/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A105
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-25
Final Depth of Penetration:	40.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	5.03e4	5.27e4
ECD	1.71e6	1.46e6
PID	9.40e4	1.45e5
FID	5.24e4	6.38e4
	PRE	POST
Flow	35.0	34.8
psi	12.2	12.5

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.40 e4	5.43 e4	5.40 e4	5.42 e4	
ECD	1.48 e6	1.48 e6	1.49 e6	1.49 e6	
PID	1.06 e5	1.11 e5	1.88 e5	5.89 e5	
FID	5.76 e4	5.81 e4	6.16 e4	7.35 e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	5.17e4	5.15e4	5.17e4	5.16e4	
ECD	1.45e6	1.45e6	1.46e6	1.46e6	
PID	1.12e5	1.19e5	2.22e5	1.16e6	
FID	5.25e4	5.33e4	5.52e4	9.30e4	

OBSERVATIONS

0.00 Start Push **15:32**

PID Gain and Attenuation to Medium and 10 at 9.95'

PID Attenuation and Gain to 1 and High at 15.00'

40.05 End Push. **16:22**

39.83545 N

74.96396 W

Elevation 104 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-26
Date/Time:	9/27/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-26
Final Depth of Penetration:	60.30
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	71
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	2.72e4	6.39e4
ECD	1.71e6	1.56e6
PID	1.09e5	7.86e5
FID	4.16e4	1.25e5

	PRE	POST
Flow	36.3	35.6
psi	12.3	12.4

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.46e4	2.46e4	2.46e4	2.47e4	
ECD	1.40e6	1.43e6	1.43e6	1.42e6	
PID	9.95e4	1.15e5	2.44e5	1.20e5	
FID	4.17e4	4.26e4	4.67e4	7.93e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.22e4	3.23e4	3.27e4	3.25e4	
ECD	1.40e6	1.41e6	1.42e6	1.41e6	
PID	1.28e5	1.32e5	1.99e5	8.55e5	
FID	5.20e4	5.34e4	5.61e4	7.81e4	

OBSERVATIONS

0.00 Start Push 08:51

PID Gain and Attenuation to Medium and 10 at 10.95'

PID Attenuation and Gain to 1 and High at 29.90'

CPT Dissipation test at 28.95'

PID Gain and Attenuation to Medium and 10 at 39.95'

PID Attenuation and Gain to 1 and High at 44.00'

60.30 End Push. Refusal. 10:12

39.83655 N

74.96277 W

Elevation 104 feet

Accuracy = 9 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-27
Date/Time:	9/27/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-27
Final Depth of Penetration:	63.75
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	3.12e4	4.05e4
ECD	1.66e6	1.38e6
PID	9.88e4	4.10e5
FID	4.82e4	6.25e4
	PRE	POST
Flow	35.3	34.9
psi	12.2	12.4

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.22e4	3.23e4	3.27e4	3.25e4	
ECD	1.40e6	1.41e6	1.42e6	1.41e6	
PID	1.28e5	1.32e5	1.99e5	8.55e5	
FID	5.20e4	5.34e4	5.61e4	7.81e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.43e4	3.43e4	3.44e4	3.43e4	
ECD	1.43e6	1.44e6	1.44e6	1.44e6	
PID	1.41e5	1.44e5	2.28e5	1.06e6	
FID	5.83e4	5.86e4	6.14e4	9.49e4	

OBSERVATIONS

0.00 Start Push 11:02

PID Gain and Attenuation to Medium and 10 at 12.95'

PID Attenuation and Gain to 1 and High at 29.00'

CPT Dissipation test at 20.00'

63.75 End Push. Refusal. 12:23

Need to remove data from 63.75 to 65.35. The clamp was moved down without pushing rod.

39.83687 N

74.96236 W

Elevation 121 feet

Accuracy = 8 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-28
Date/Time:	9/27/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-28
Final Depth of Penetration:	61.95
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73

MIP QA/QC DATA

	PRE	POST
XSD	3.26e4	3.64e4
ECD	1.71e6	1.41e6
PID	1.31e5	1.67e5
FID	5.42e4	5.89e4
	PRE	POST
Flow	34.9	34.5
psi	12-3	12.4

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.43 e4	3.43 e4	3.44 e4	3.43 e4	
ECD	1.43 e6	1.44 e6	1.44 e6	1.44 e6	
PID	1.41 e5	1.44 e5	2.28 e5	1.06 e6	
FID	5.83 e4	5.86 e4	6.14 e4	9.49 e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
~~XSD~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	
ECD	1.50e6	1.50e6	1.50e6	1.50e6	
PID	1.16e5	1.17e5	1.60e5	5.91e5	
FID	6.87e4	6.93e4	7.05e4	8.85e4	
XSD	3.64e4	3.61e4	3.62e4	3.61e4	

OBSERVATIONS

0.00 Start Push **13:38**

PID Gain and Attenuation to Medium and 10 at 12.05'

PID Attenuation and Gain to 1 and High at 20.00'

CPT Dissipation tests at 40.05' and 60.60'

61.95 End Push. Refusal. **15:20**

39.83667 N

74.96258 W

Elevation 112 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-29
Date/Time:	9/28/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-29
Final Depth of Penetration:	67.40
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74

MIP QA/QC DATA

	PRE	POST
XSD	3.79e4	4.99e4
ECD	1.69e6	1.34e6
PID	7.94e4	2.63e5
FID	4.07e4	4.57e4

	PRE	POST
Flow	36.2	35.6
psi	12.2	12.3

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.85e4	3.83e4	3.83e4	3.72e4	
ECD	1.37e6	1.37e6	1.37e6	1.36e6	
PID	8.07e5	8.57e4	1.36e5	6.28e5	
FID	4.27e4	4.28e4	4.26e4	5.99e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.84e4	3.85e4	3.85e4	3.87e4	
ECD	1.37e6	1.38e6	1.37e6	1.38e6	
PID	1.08e5	1.12e5	1.53e5	6.84e5	
FID	3.90e4	3.97e4	4.14e4	6.15e4	

OBSERVATIONS

0.00 Start Push 08:53

PID Gain and Attenuation to Medium and 10 at 18.00'

CPT Dissipation tests at 29.00'

PID Gain and Attenuation to High and 1 at 33.00'

67.40 End Push. Refusal. 10:21

39.83652 N

74.96245 W

Elevation 101 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-30
Date/Time:	9/28/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-30
Final Depth of Penetration:	64.20
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	72

MIP QA/QC DATA

	PRE	POST
XSD	3.92e4	4.60e4
ECD	1.75e6	1.35e6
PID	1.18e5	~~[illegible]~~ 1.33e5
FID	4.24e4	4.74e4
	PRE	POST
Flow	35.3	35.0
psi	12.2	12.3

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.84e4	3.85e4	3.85e4	3.87e4	
ECD	1.37e6	1.38e6	1.37e6	1.38e6	
PID	1.08e5	1.12e5	1.53e5	6.84e5	
FID	3.90e4	3.97e4	4.14e4	6.15e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	3.90e4	3.91e4	3.88e4	3.84e4	
ECD	1.34e6	1.35e6	1.35e6	1.35e6	
PID	1.10e5	1.09e5	1.63e5	7.01e5	
FID	4.47e4	4.57e4	4.73e4	7.16e4	

OBSERVATIONS

0.00 Start Push 11:26

PID Gain and Attenuation to Medium and 10 at 7.95'

PID Attenuation and Gain to 1 and High at 20.10'

CPT Dissipation tests at 55.10' and 58.05'

64.20 End Push. Refusal. 13:10

39.83671 N

74.96295 W

Elevation 75 feet

Accuracy = 7 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-32
Date/Time:	9/29/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-32
Final Depth of Penetration:	25.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

MIP QA/QC DATA

	PRE	POST
XSD	2.66e4	2.96e4
ECD	1.64e6	1.34e6
PID	7.73e4	1.76e5
FID	3.62e4	4.00e4
	PRE	POST
Flow	35.3	35.1
psi	12.1	12.2

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.68e4	2.67e4	2.65e4	2.65e4	
ECD	1.30e6	1.30e6	1.30e6	1.30e6	
PID	7.85e4	9.16e4	1.73e5	6.43e5	
FID	3.69e4	3.72e4	3.87e4	6.19e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.76e4	2.79e4	2.82e4	2.86e4	
ECD	1.32e6	1.32e6	1.33e6	1.34e6	
PID	1.20e5	1.21e5	1.91e5	1.29e6	
FID	3.71e4	3.76e4	4.00e4	9.33e4	

OBSERVATIONS

0.00 Start Push **14:20**

PID Gain and Attenuation to Medium and 10 at 17.00'

PID Attenuation and Gain to 1 and High at 20.05'

CPT Dissipation test at 22.00'

25.05 End Push. **15:07**

39.83588 N

74.96241 W

Elevation 138 feet

Accuracy = 9 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-33
Date/Time:	9/29/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

MIP QA/QC DATA

	PRE	POST
XSD	2.32e4	2.37e4
ECD	1.62e6	1.24e6
PID	6.71e4	3.22e5
FID	2.72e4	4.40e4

	PRE	POST
Flow	37.4	36.7
psi	11.9	12.1

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

HPT Reference

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-33
Final Depth of Penetration:	25.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	73
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.31e4	2.31e4	2.33e4	2.36e4	
ECD	1.25e6	1.25e6	1.25e6	1.24e6	
PID	7.31e4	8.37e4	1.90e5	1.31e6	
FID	3.17e4	3.20e4	3.37e4	7.80e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.54e4	2.53e4	2.52e4	2.53e4	
ECD	1.24e6	1.24e6	1.24e6	1.24e6	
PID	1.26e5	1.26e5	1.79e5	7.69e5	
FID	3.29e4	3.40e4	3.49e4	5.85e4	

OBSERVATIONS

0.00 Start Push 08:35

PID Gain and Attenuation to Medium and 10 at 19.10'

PID Attenuation and Gain to 1 and High at 22.10'

CPT Dissipation test at 22.10'

25.05 End Push. 09:16

39.83575 N

74.96292 W

Elevation 104 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-34
Date/Time:	9/29/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-34
Final Depth of Penetration:	26.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	75
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74

MIP QA/QC DATA

	PRE	POST
XSD	2.41e4	2.62e4
ECD	1.63e6	1.25e6
PID	1.00e5	1.75e5
FID	3.32e4	3.49e4
	PRE	POST
Flow	36.2	35.9
psi	11.9	12.1

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.54e4	2.53e4	2.52e4	2.53e4	
ECD	1.24e6	1.24e6	1.24e6	1.24e6	
PID	1.26e5	1.26e5	1.79e5	7.69e5	
FID	3.29e4	3.40e4	3.49e4	5.85e4	

Post-Log Peak Response Data

Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.52e4	2.52e4	2.52e4	2.55e4	
ECD	1.24e6	1.25e6	1.26e6	1.26e6	
PID	1.07e5	1.14e5	1.97e5	1.03e6	
FID	3.22e4	3.41e4	3.61e4	6.99e4	

OBSERVATIONS

0.00 Start Push 09:59

CPT Dissipation test at 25.00'

26.00 End Push. 10:39

39.83583 N

74.96243 W

Elevation 87 feet

Accuracy = 9 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-35
Date/Time:	9/29/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-35
Final Depth of Penetration:	25.05
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74

MIP QA/QC DATA

	PRE	POST
XSD	2.60 e4	2.61e4
ECD	1.69e6	1.27e6
PID	9.18e4	3.92e5
FID	3.56e4	5.09e4
	PRE	POST
Flow	35.7	35.4
psi	11.9	12.1

HPT Reference

Pre-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.52e4	2.52e4	2.52e4	2.55e4	
ECD	1.24e6	1.25e6	1.26e6	1.26e6	
PID	1.07e5	1.14e5	1.97e5	1.03e6	
FID	3.22e4	3.41e4	3.61e4	6.99e4	

Post-Log Peak Response Data					
Detector	Concentration (ppm)				
	BL	1	10	100	
XSD	2.70e4	2.72e4	2.71e4	2.69e4	
ECD	1.29e6	1.30e6	1.29e6	1.30e6	
PID	1.07e5	1.17e5	1.95e5	1.19e6	
FID	3.53e4	3.63e4	3.98e4	8.85e4	

OBSERVATIONS

0.00 Start Push 11:20

PID Gain and Attenuation to Medium and 10 at 14.05'

PID Attenuation and Gain to 1 and High at 21.05'

CPT Dissipation test at 22.05'

25.05 End Push. 11:58

39.83600 N

74.96281 W

Elevation 103 feet

Accuracy = 6 feet

MIP FIELD INFORMATION FORM

SITE INFORMATION

Site Name:	Sherwin-Williams Manufacturing Plant
Location Name:	CPT-MIP17-36
Date/Time:	9/29/17
MIP Operator:	Jaime S. Ricci
MIP Contractor:	ASC Tech Services

INSTRUMENT INFORMATION

Detectors Used:	XSD / ECD / PID / FID
Probe Type:	MP6520/MP4520/MH6530
Probe S/N	P=23550, F=A106
HPT Sensor ID	N/A

LOGGING INFORMATION

MIP File Name:	CPT-MIP17-36
Final Depth of Penetration:	25.00
Pre-Log Response Test File Name:	*.pre.tim
Response Test Compound:	Benzene
Trip Time (seconds):	74
Post Log Response Test File Name:	*.post.tim
Response Test Compound:	Benzene
Trip Time (seconds):	

MIP QA/QC DATA

	PRE	POST
XSD	2.59e4	2.74e4
ECD	1.67e6	1.29e6
PID	9.05e4	9.60e4
FID	3.60e4	3.46e4

	PRE	POST
Flow	35.3	35.2
psi	11.9	12.1

HPT Reference

Pre-Log Peak Response Data

Detector	Concentration (ppm) BL	1	10	100	
XSD	2.70e4	2.72e4	2.71e4	2.69e4	
ECD	1.29e6	1.30e6	1.29e6	1.30e6	
PID	1.07e5	1.17e5	1.95e5	1.19e6	
FID	3.53e4	3.63e4	3.98e4	8.85e4	

Post-Log Peak Response Data

Detector	Concentration (ppm) BL	1	10	100	
XSD	2.68e4	2.67e4	2.65e4	2.65e4	
ECD	1.30e6	1.30e6	1.30e6	1.30e6	
PID	7.85e4	9.16e4	1.73e5	6.43e5	
FID	3.69e4	3.72e4	3.97e4	6.19e4	

OBSERVATIONS

0.00 Start Push 13:12

CPT Dissipation test at 22.05'

25.00 End Push. 13:48

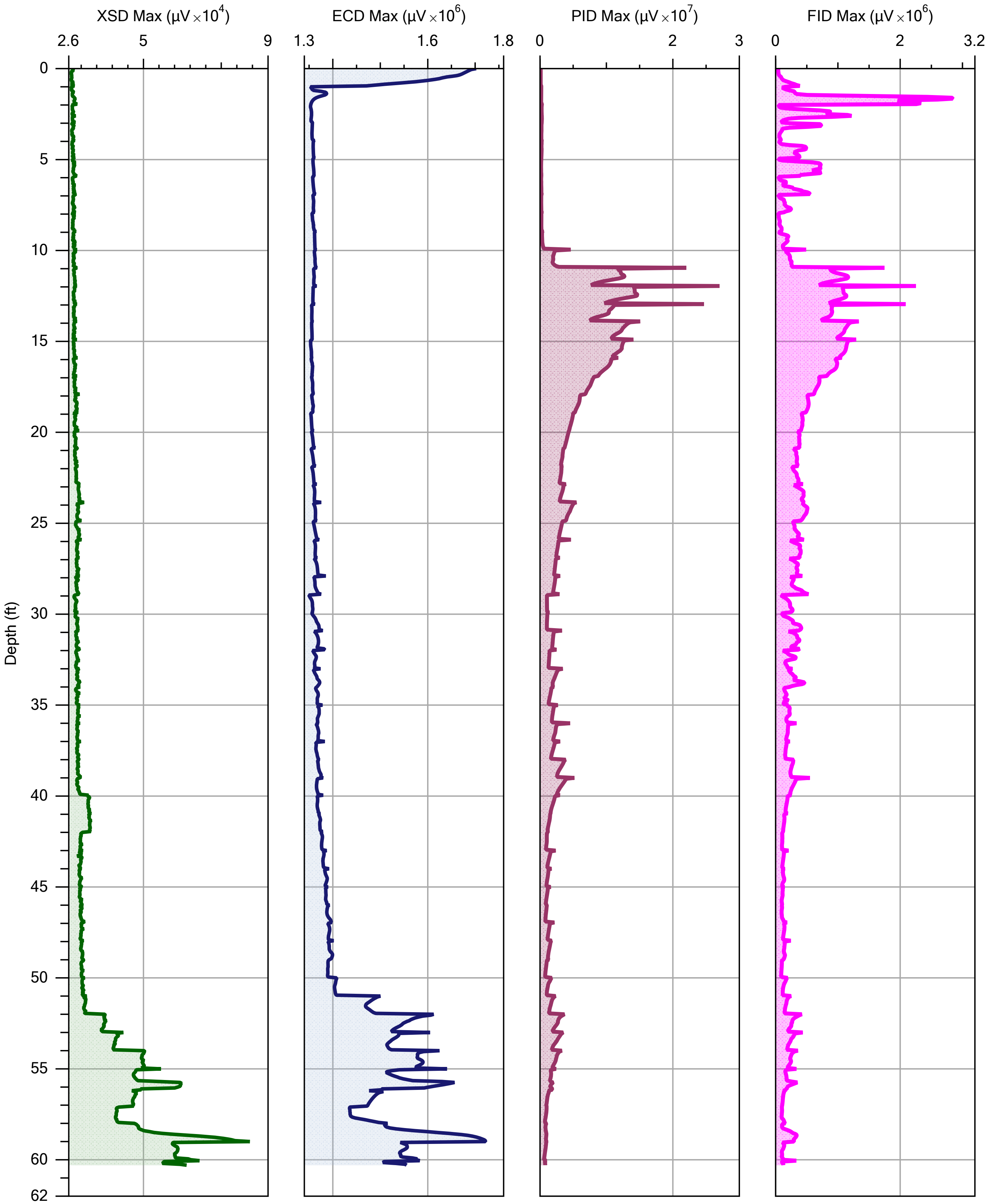
39.83580 N

74.96257 W

Elevation 101 feet

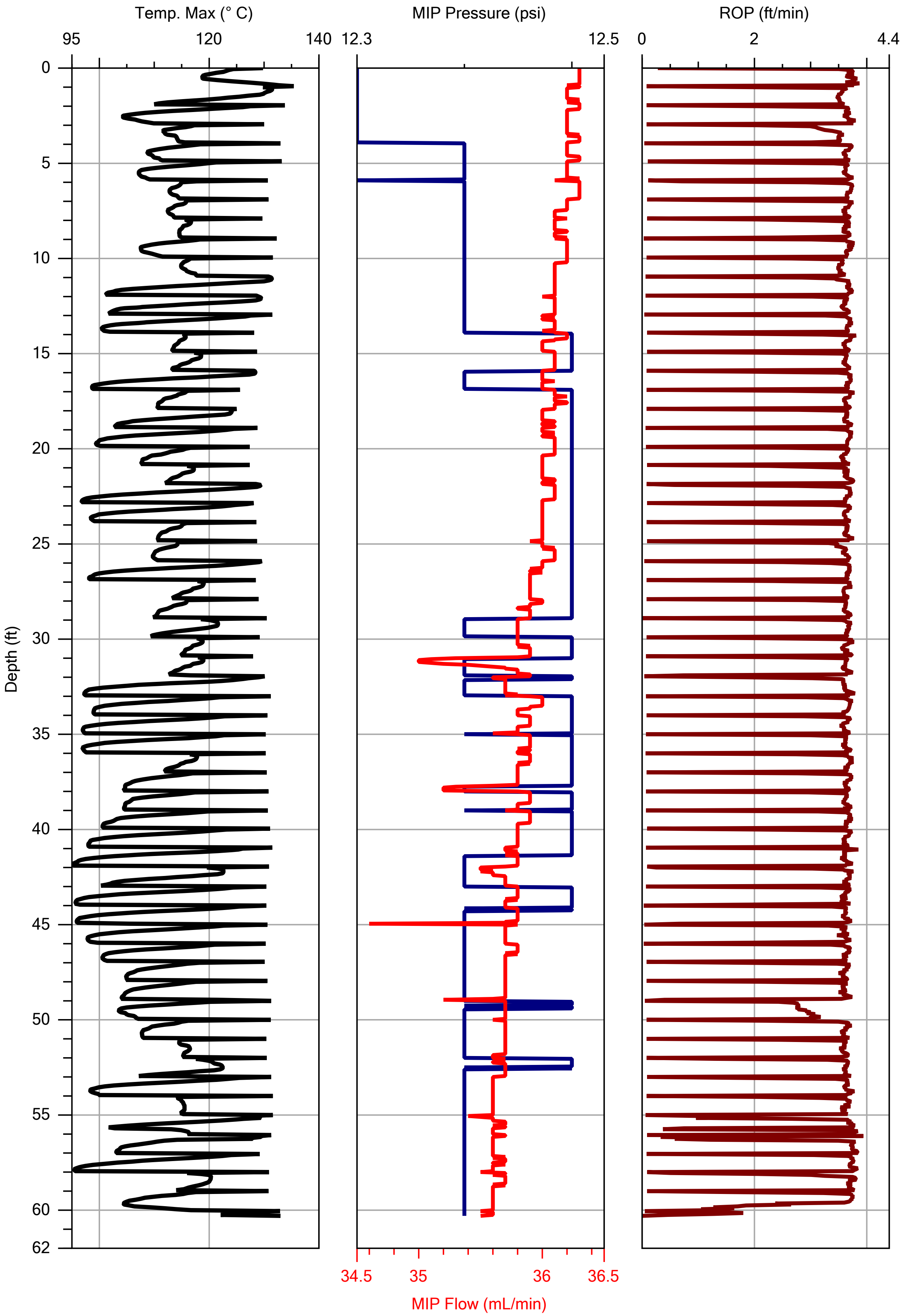
Accuracy = 8 feet

APPENDIX B
MIP LOGS



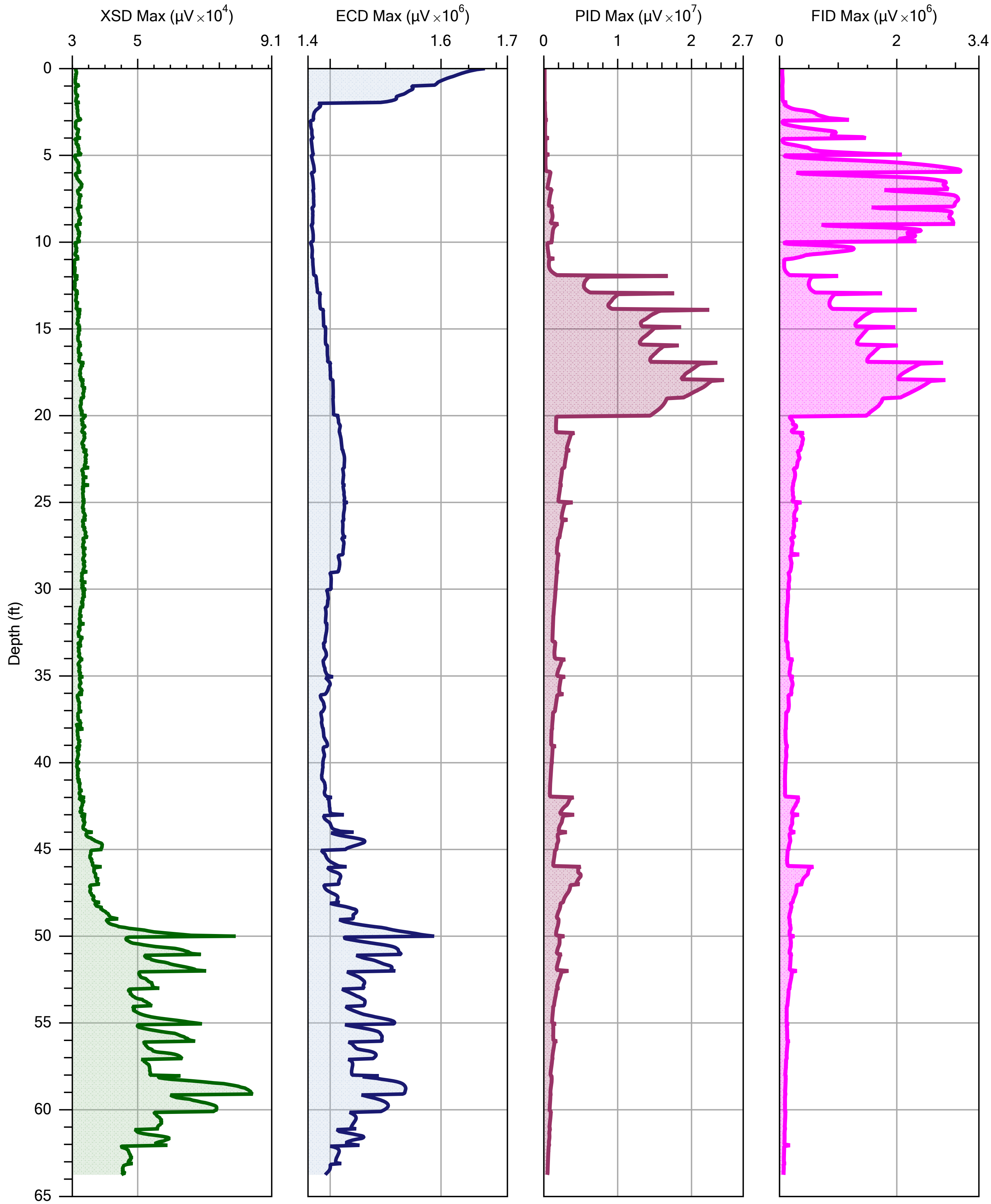
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-26.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 46″ W



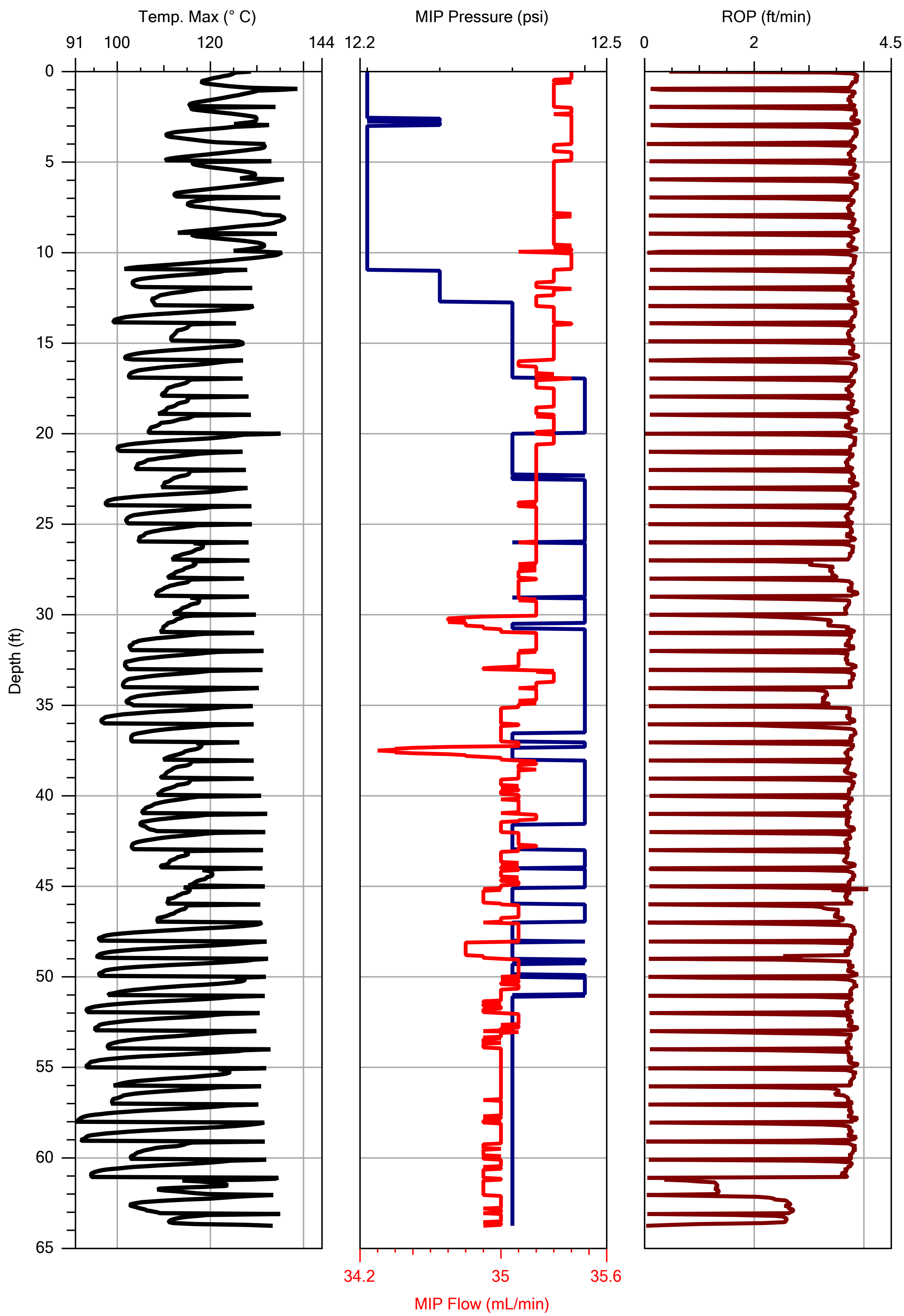
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-26.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 46″ W



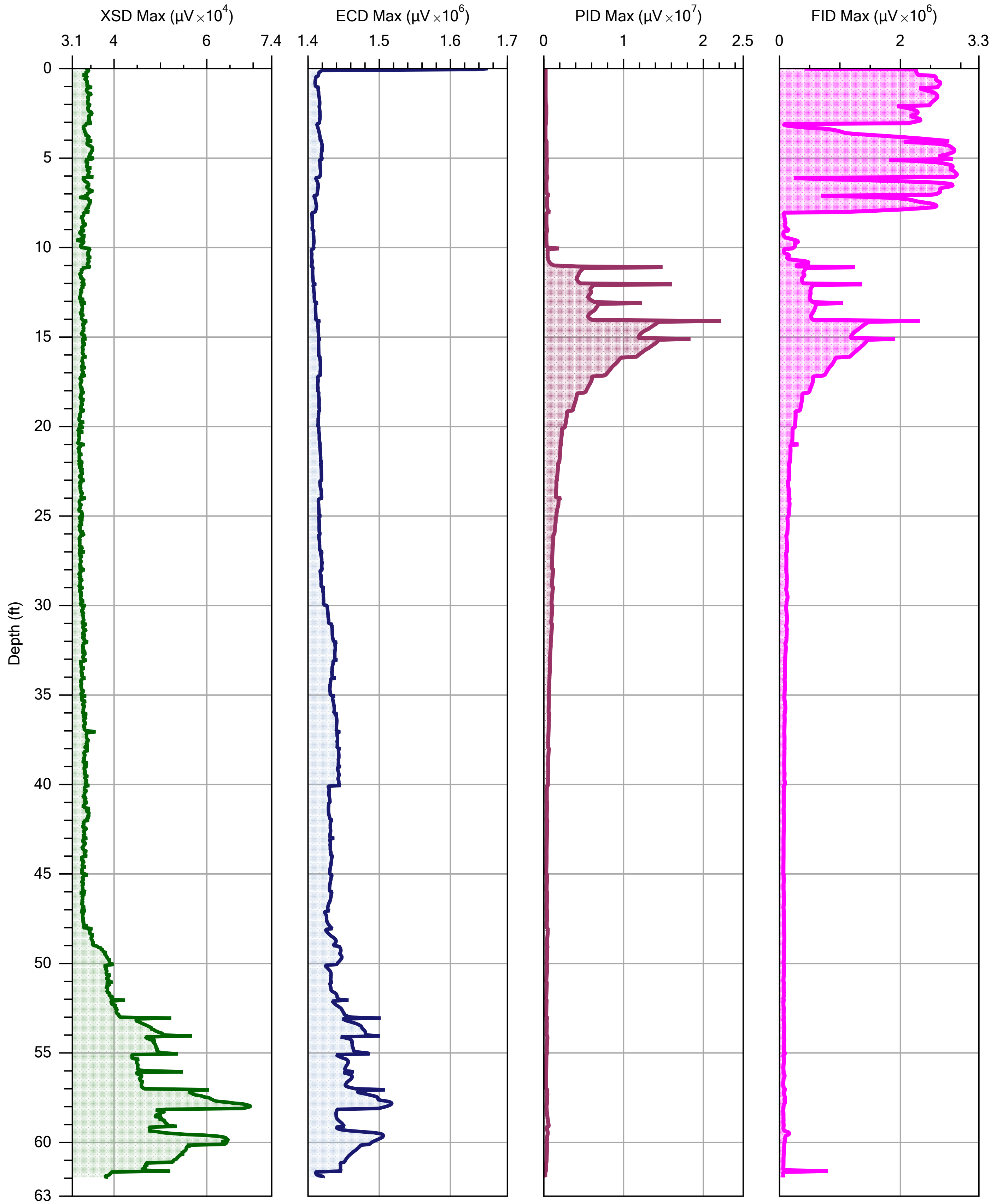
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-27.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 13″ N, 74° 57′ 44″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

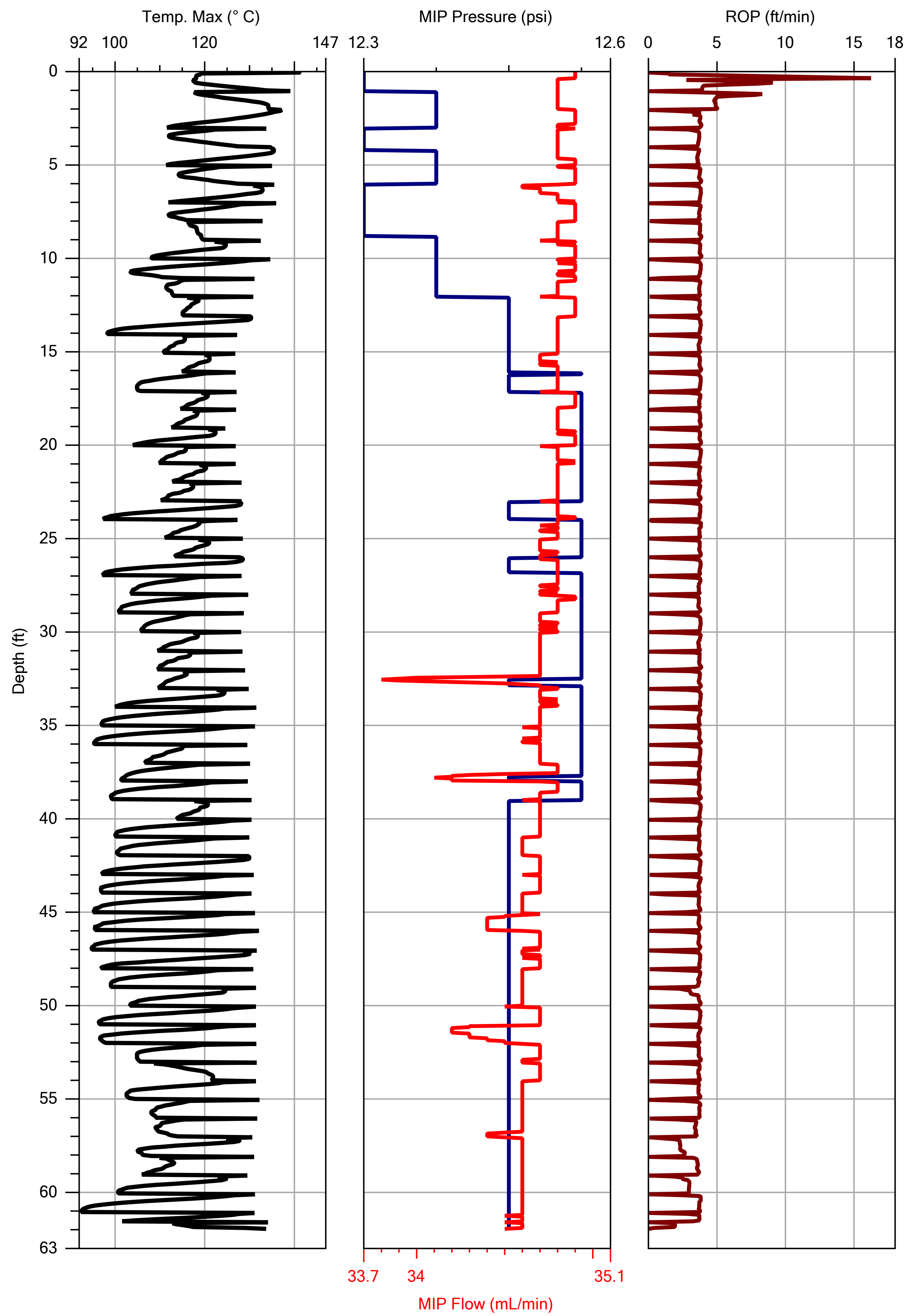
		File: CPT-MIP17-27.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 13″ N, 74° 57′ 44″ W



![ASC Tech Services logo]

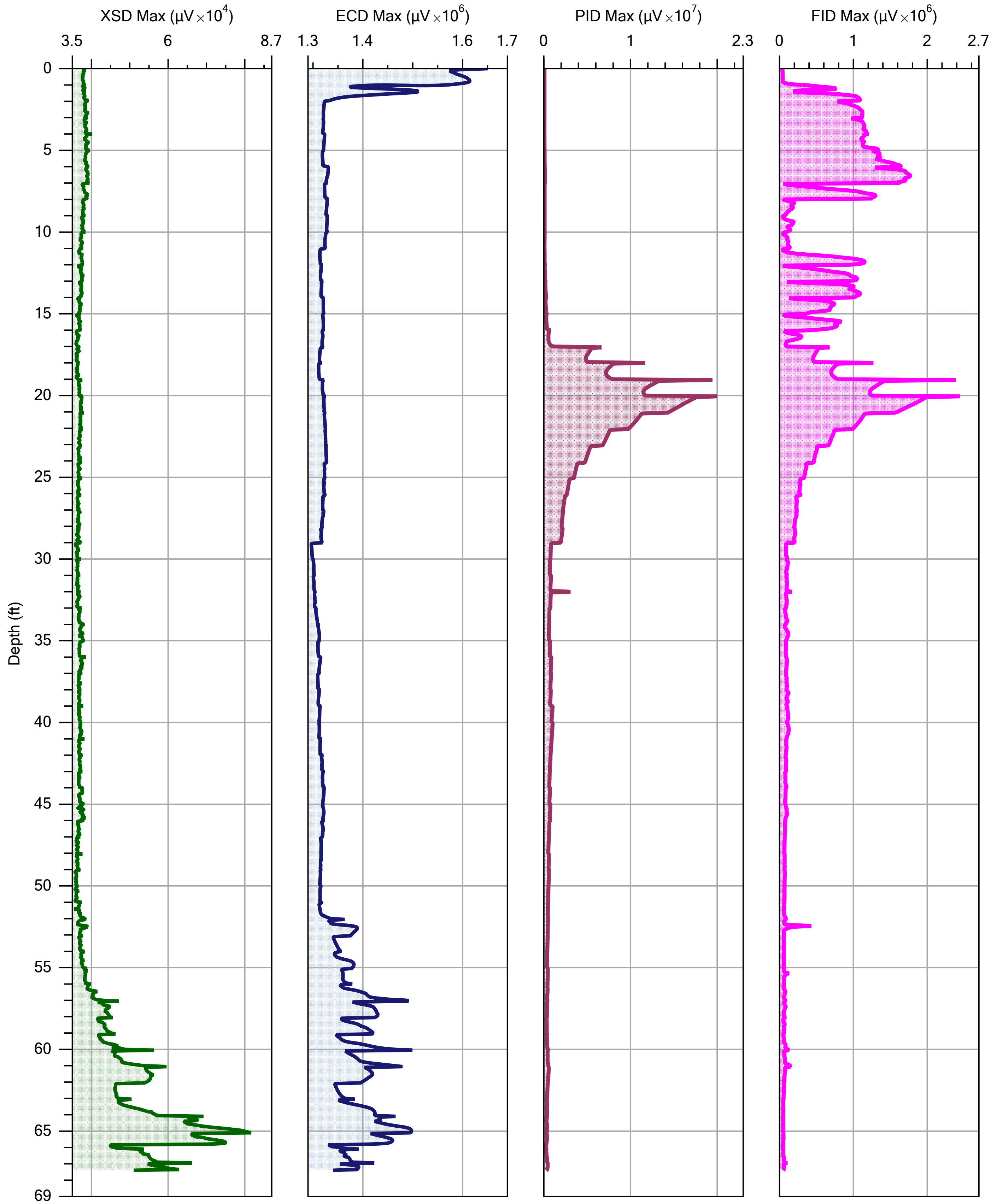
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-28.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 45″ W



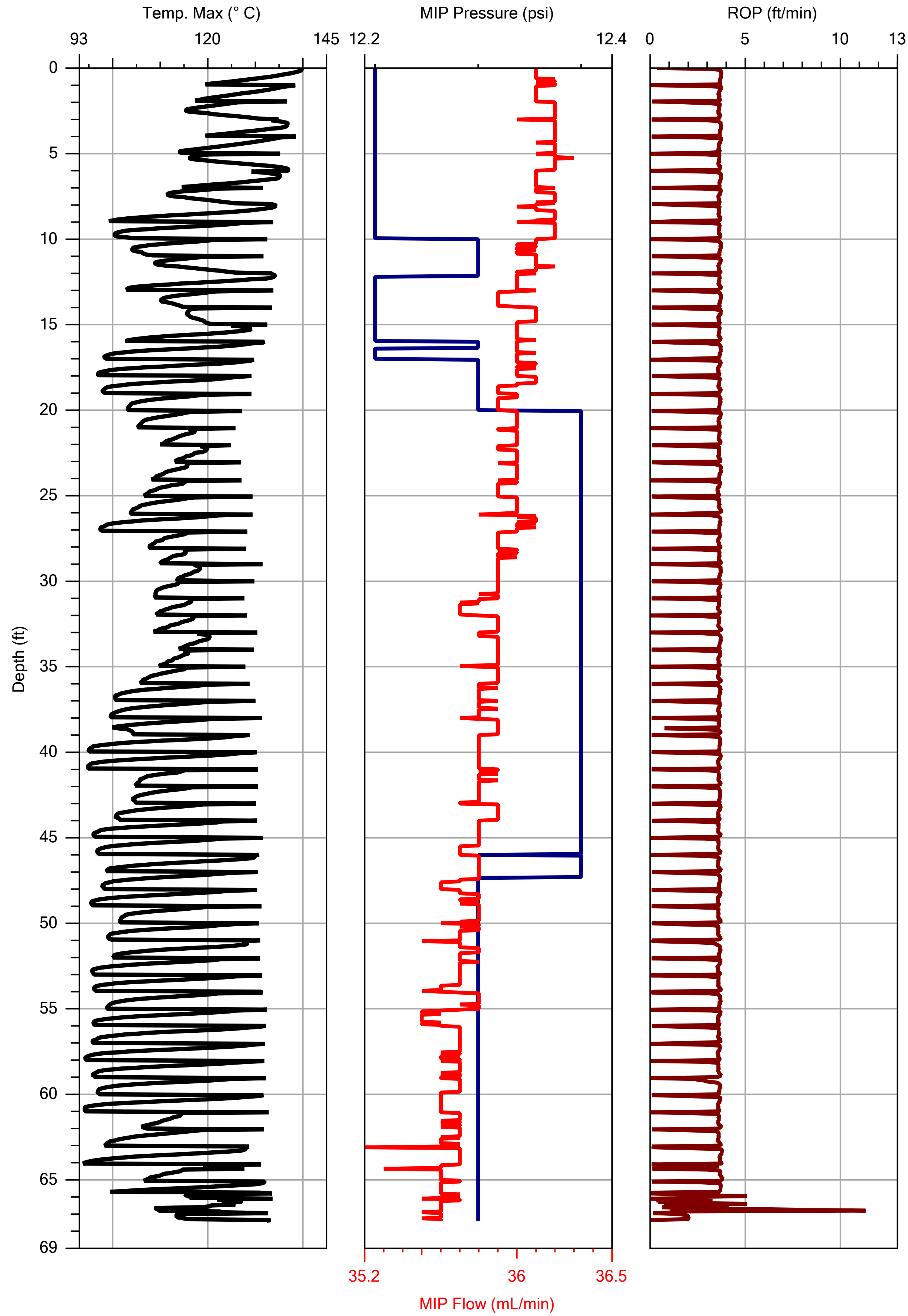
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

Company: ASC Tech Services	Operator: Jaime Ricci	File: CPT-MIP17-28.MIP Date: 9/27/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 45″ W



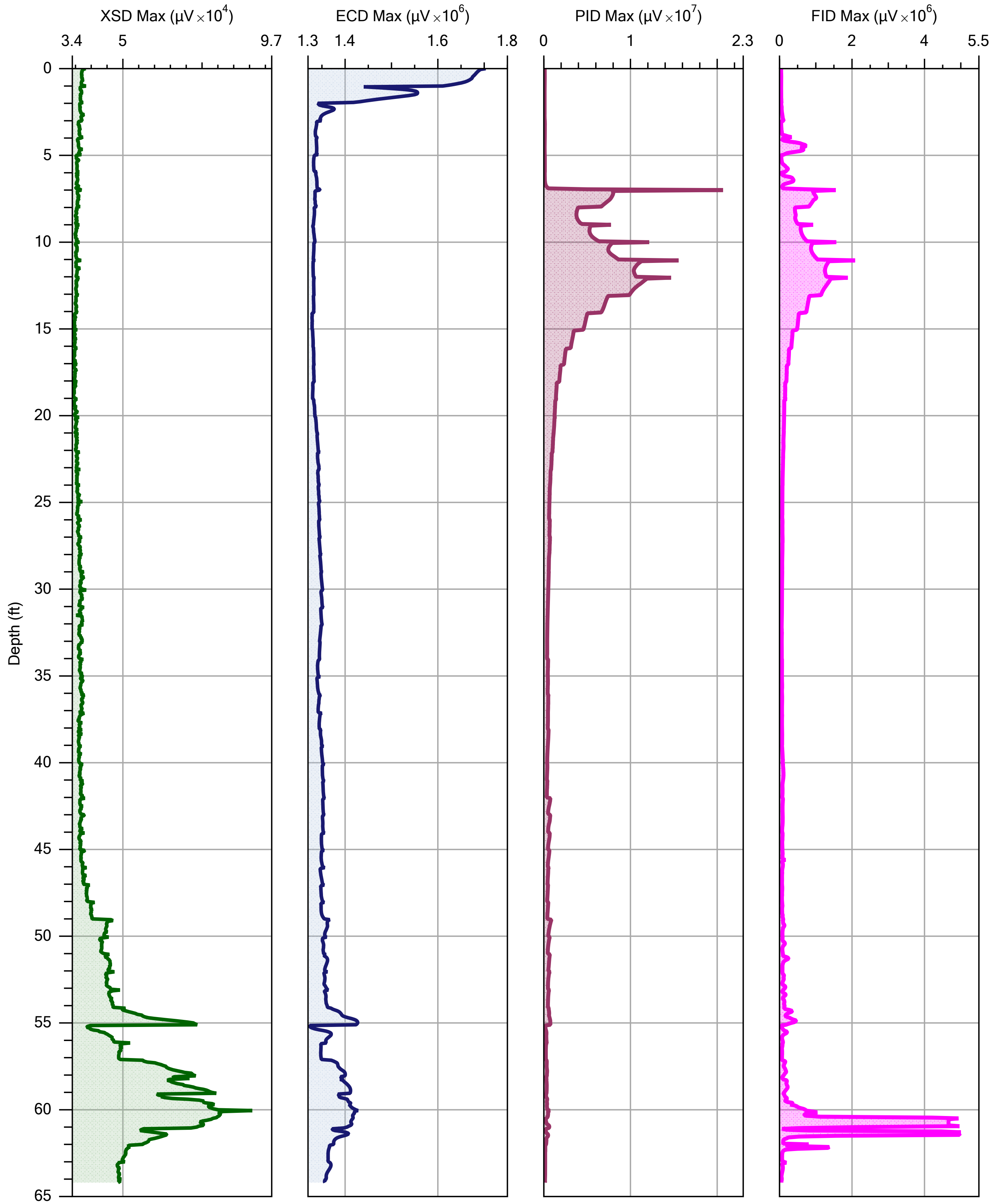
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-29.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/28/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 11″ N, 74° 57′ 45″ W



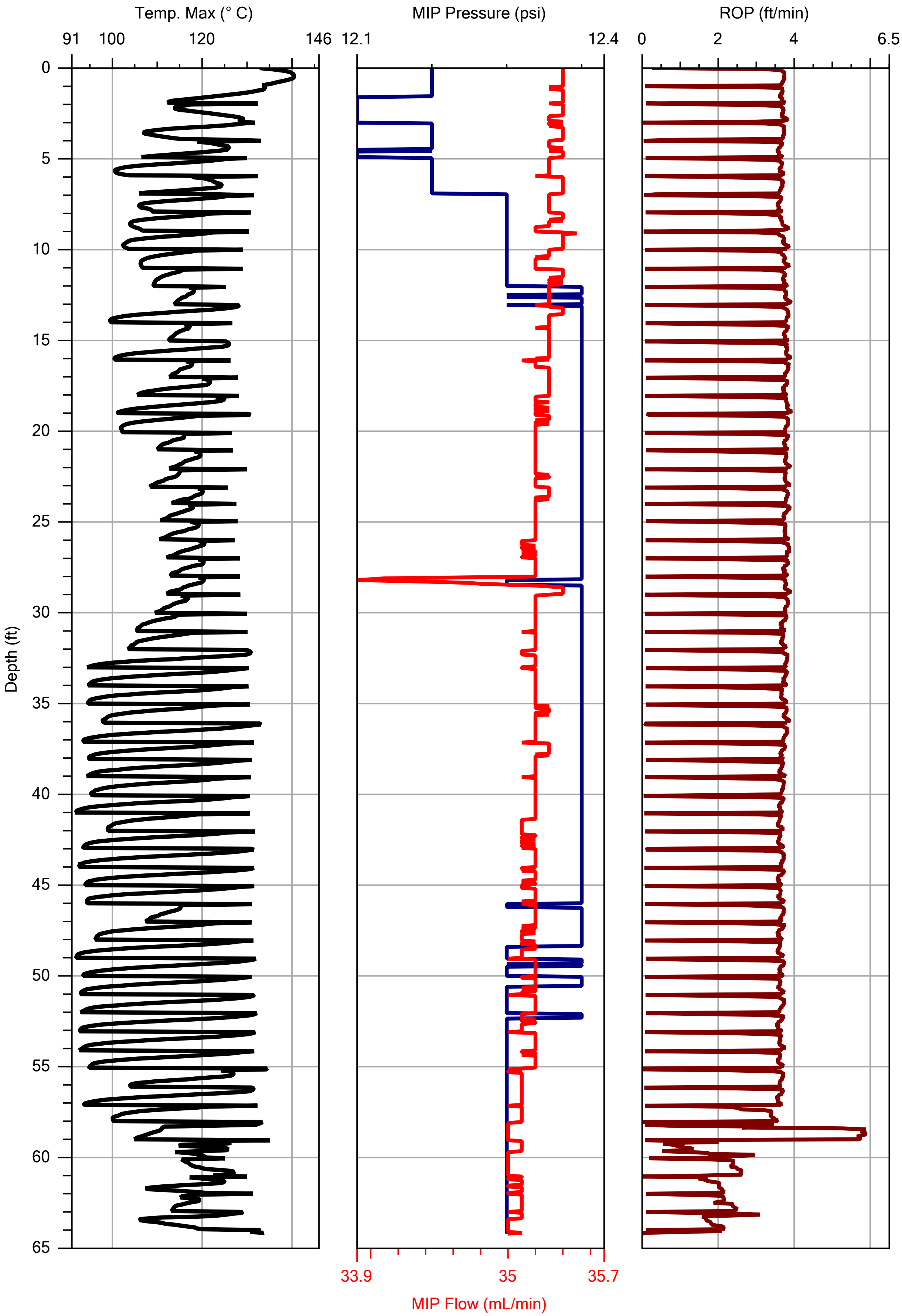
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-29.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/28/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 11″ N, 74° 57′ 45″ W



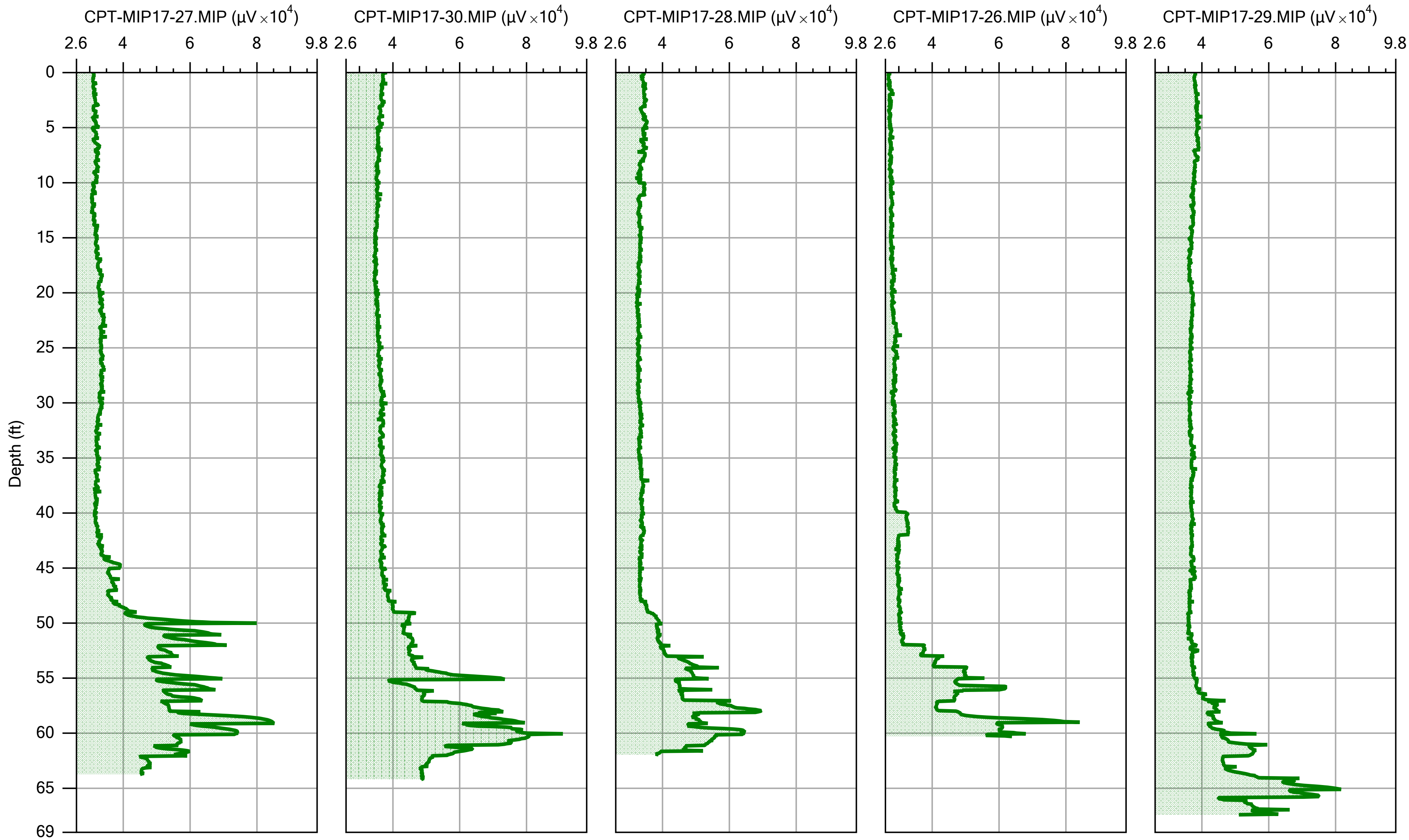
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-30.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/28/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 47″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-30.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/28/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 47″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

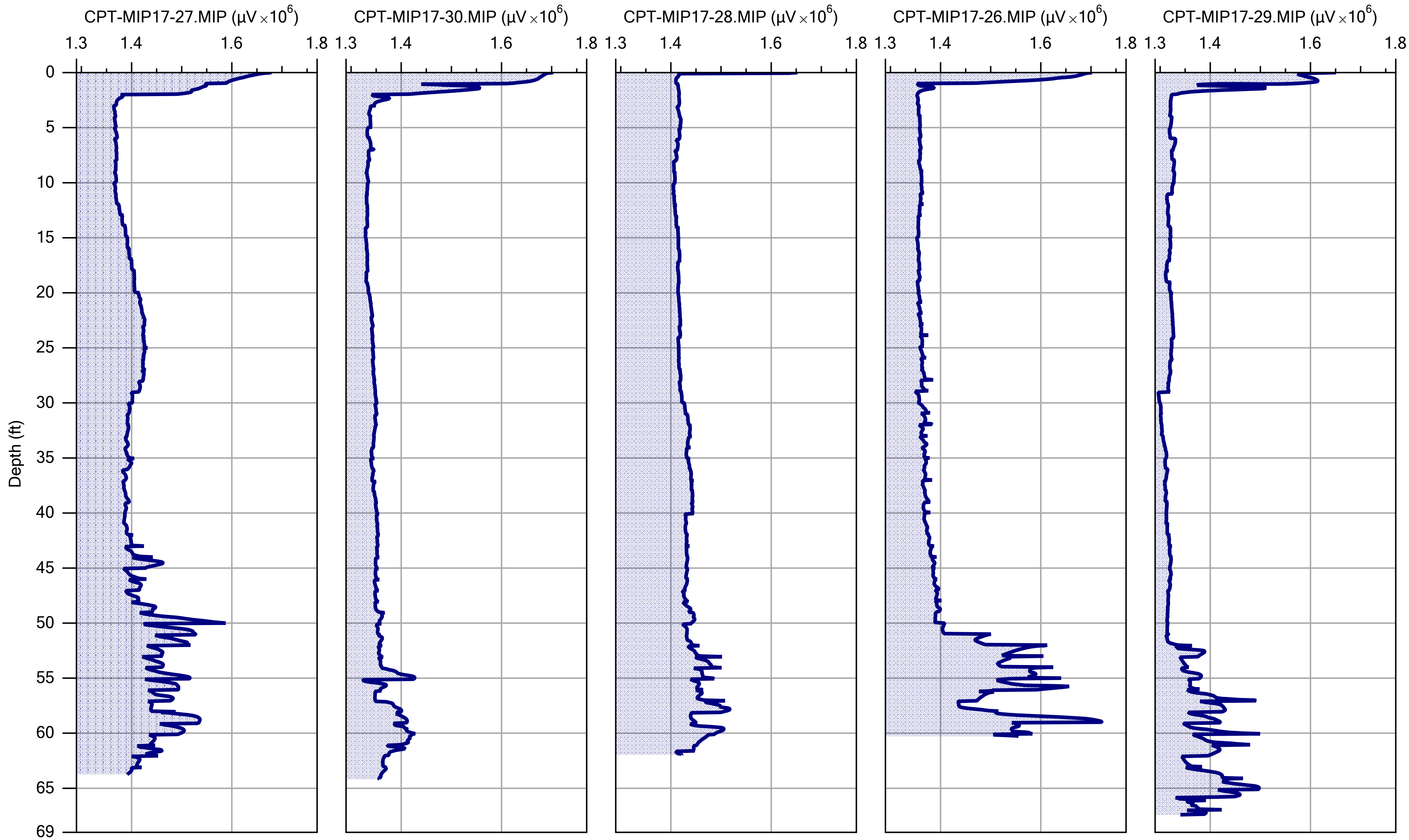
CPT-MIP17-27.MIP 9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W

CPT-MIP17-30.MIP 9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W

CPT-MIP17-28.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W

CPT-MIP17-26.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W

CPT-MIP17-29.MIP 9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W



CPT-MIP17-27.MIP	9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W	
CPT-MIP17-30.MIP	9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W	
CPT-MIP17-28.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W	
CPT-MIP17-26.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W	
CPT-MIP17-29.MIP	9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W	

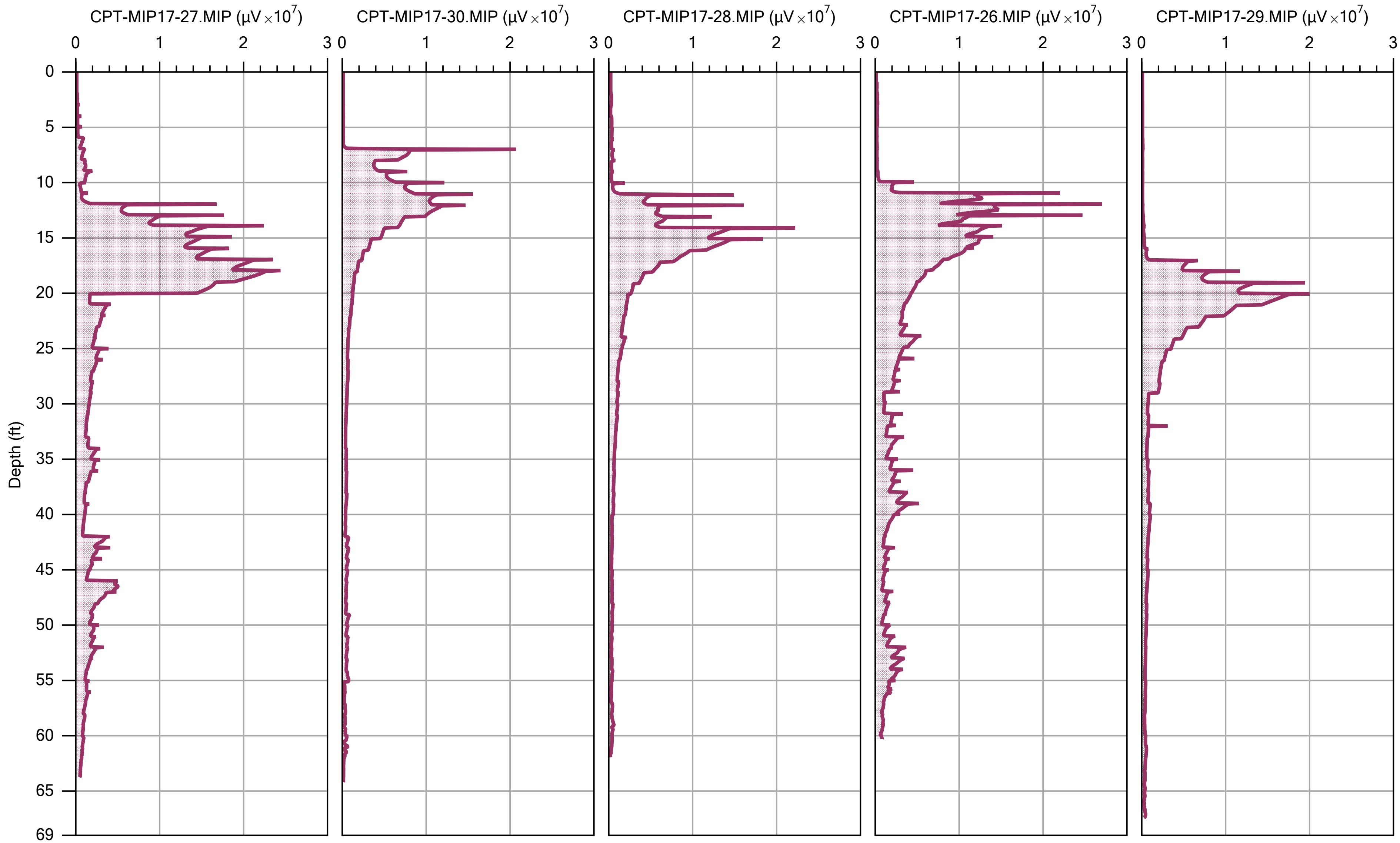
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-27.MIP 9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W

CPT-MIP17-30.MIP 9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W

CPT-MIP17-28.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W

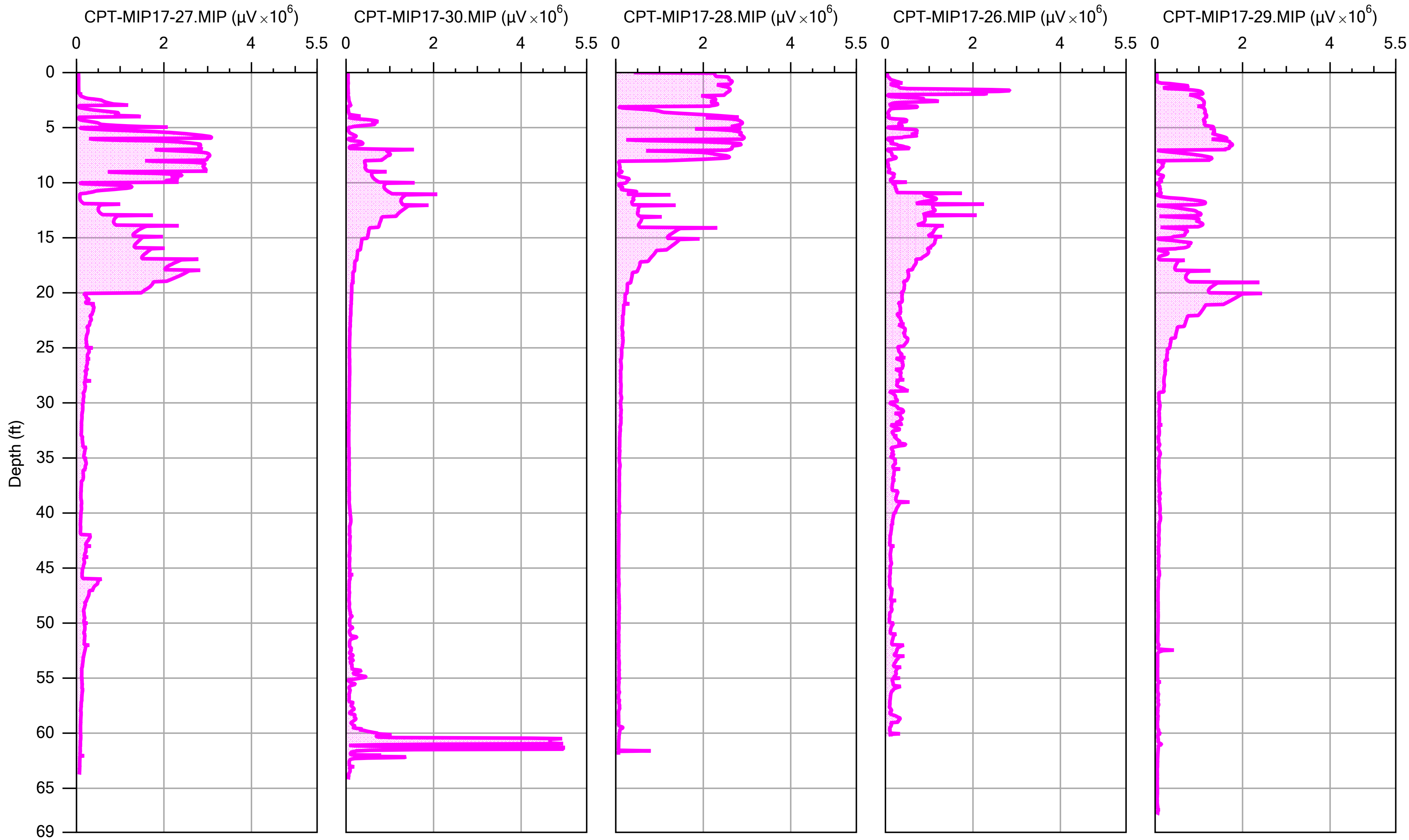
CPT-MIP17-26.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W

CPT-MIP17-29.MIP 9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W

ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-27.MIP	9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W	
CPT-MIP17-30.MIP	9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W	
CPT-MIP17-28.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W	
CPT-MIP17-26.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W	
CPT-MIP17-29.MIP	9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W	

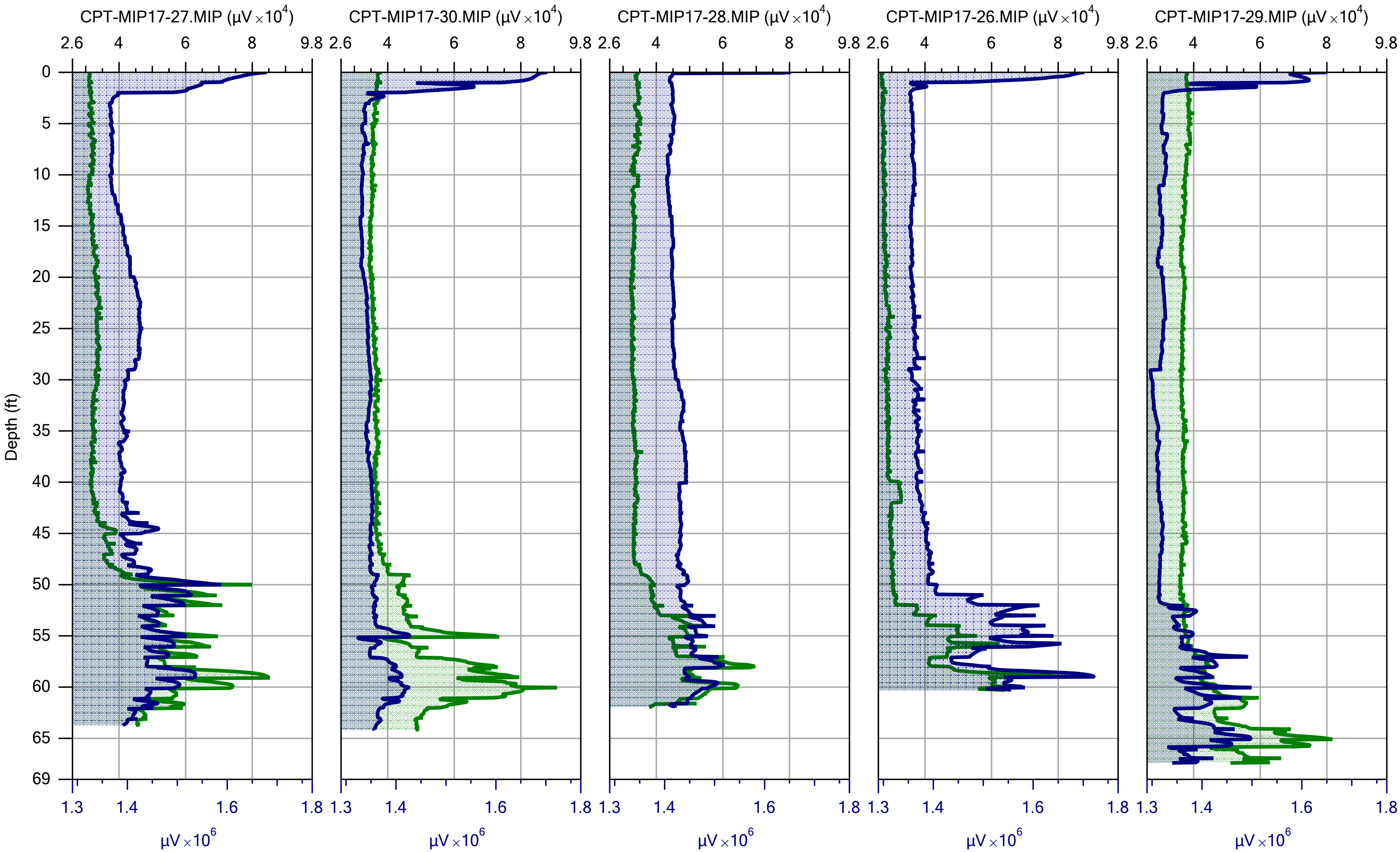
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-27.MIP 9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W

CPT-MIP17-30.MIP 9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W

CPT-MIP17-28.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W

CPT-MIP17-26.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W

CPT-MIP17-29.MIP 9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W

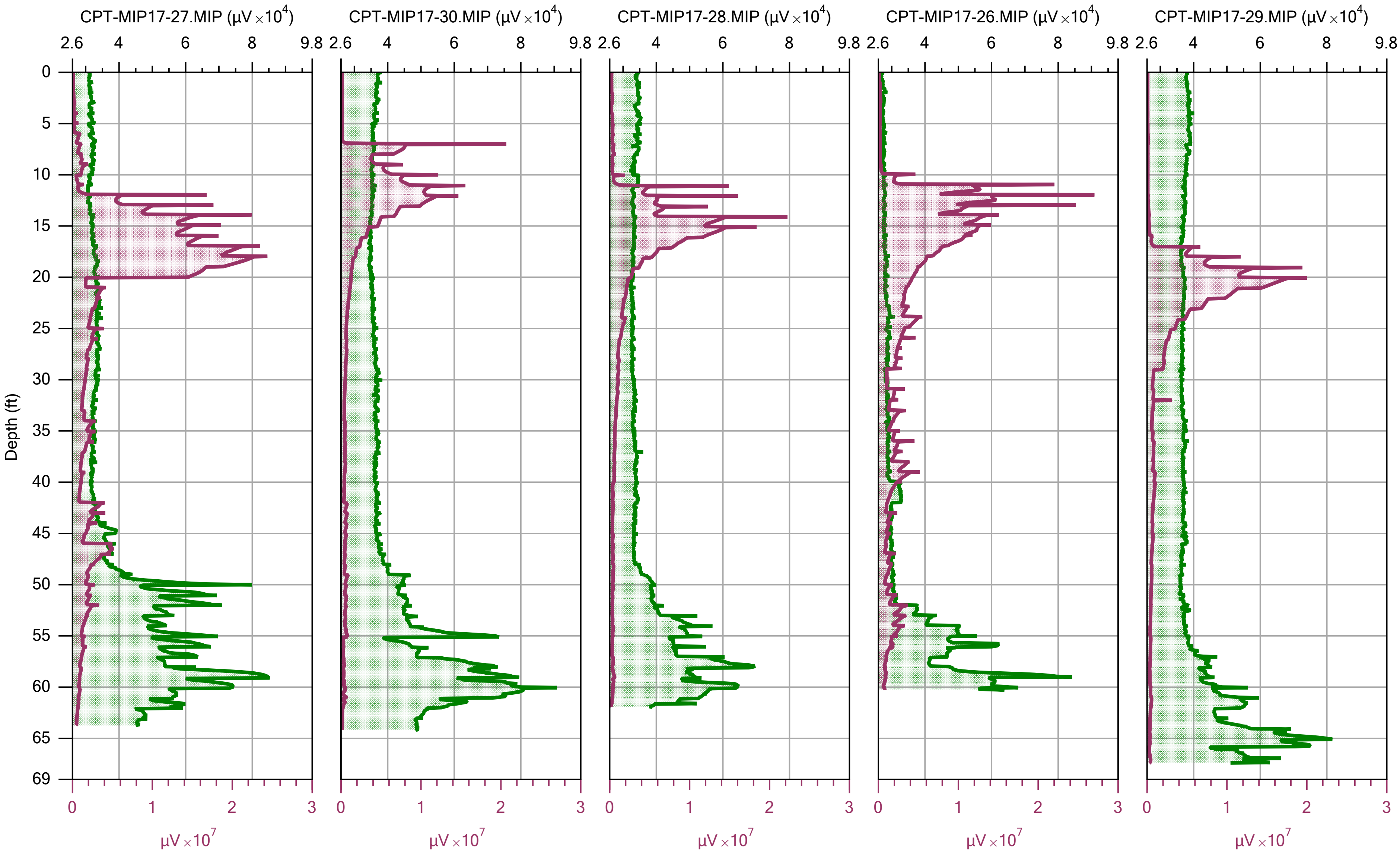
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-27.MIP	9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W	
CPT-MIP17-30.MIP	9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W	
CPT-MIP17-28.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W	
CPT-MIP17-26.MIP	9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W	
CPT-MIP17-29.MIP	9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W	

ASC

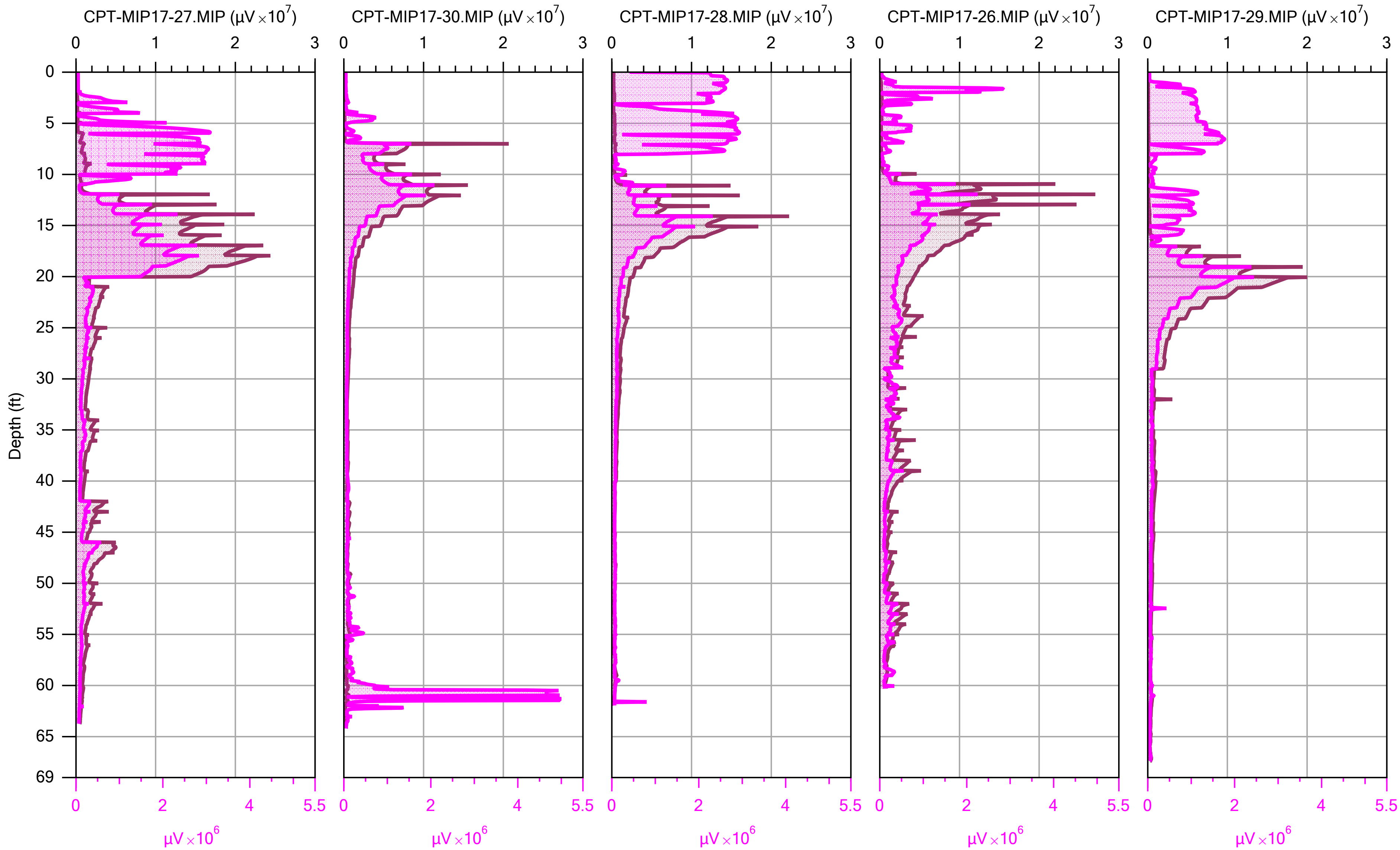
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-27.MIP 9/27/2017
39° 50′ 13″ N, 74° 57′ 44″ W

CPT-MIP17-30.MIP 9/28/2017
39° 50′ 12″ N, 74° 57′ 47″ W

CPT-MIP17-28.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 45″ W

CPT-MIP17-26.MIP 9/27/2017
39° 50′ 12″ N, 74° 57′ 46″ W

CPT-MIP17-29.MIP 9/28/2017
39° 50′ 11″ N, 74° 57′ 45″ W

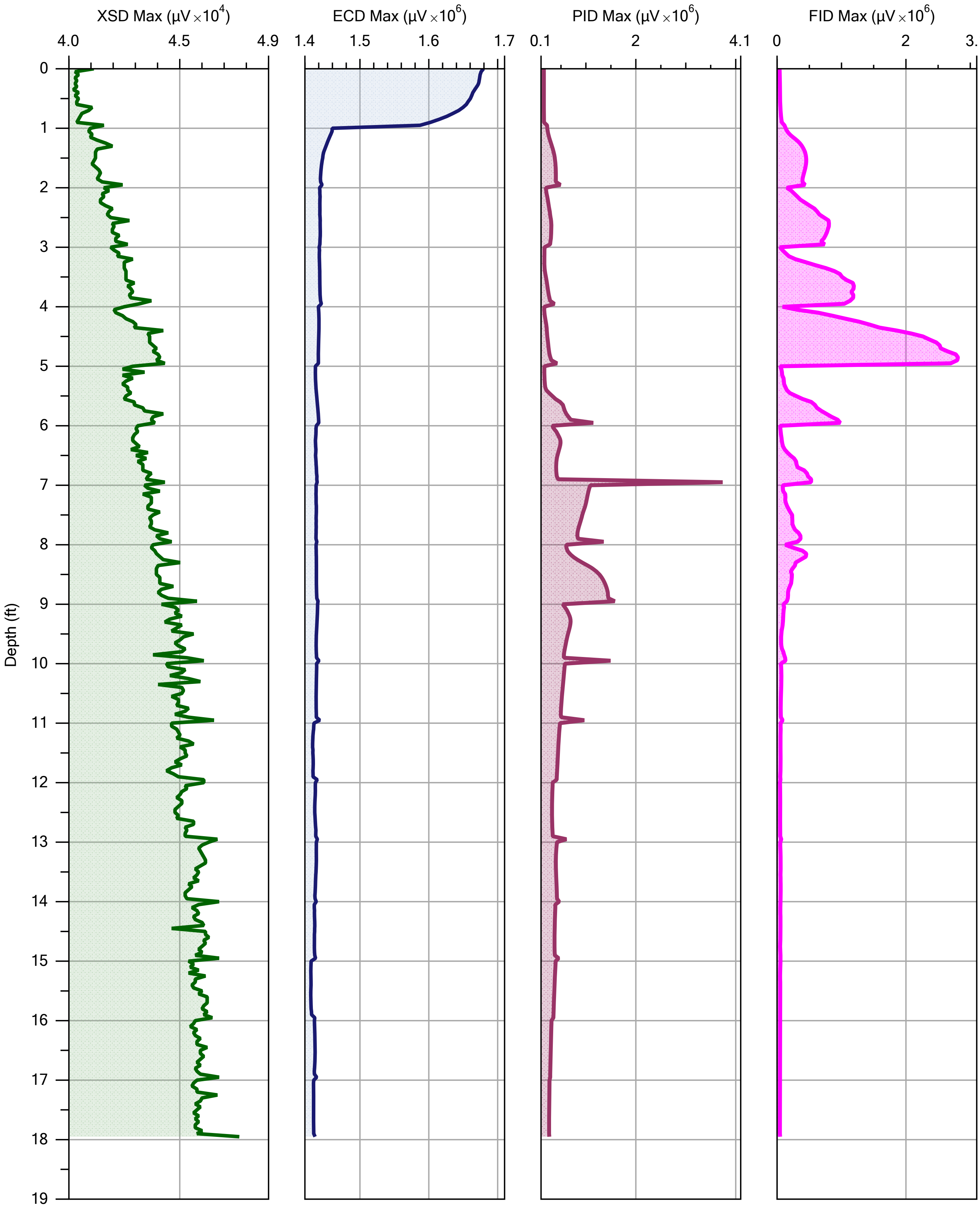
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

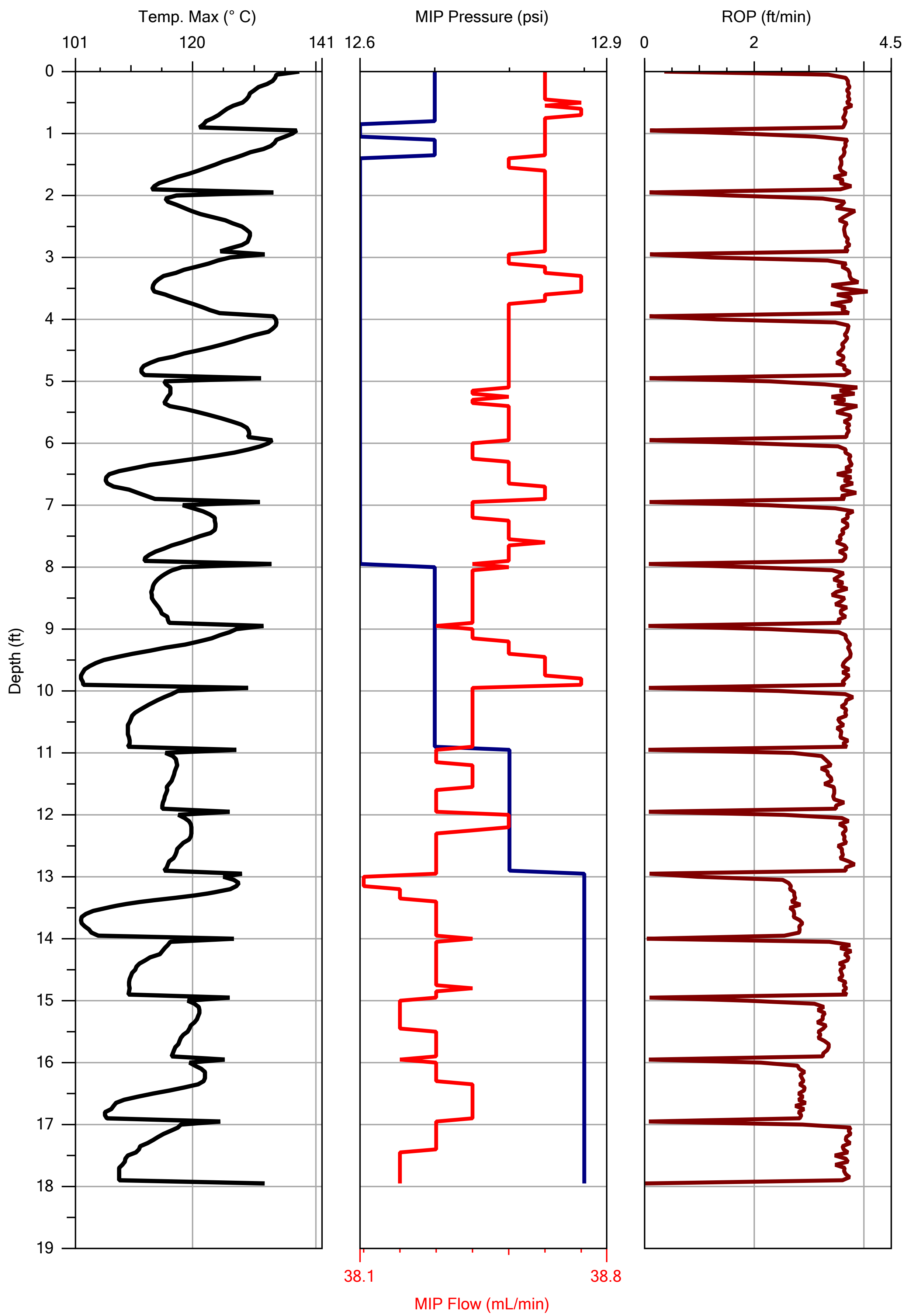
PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



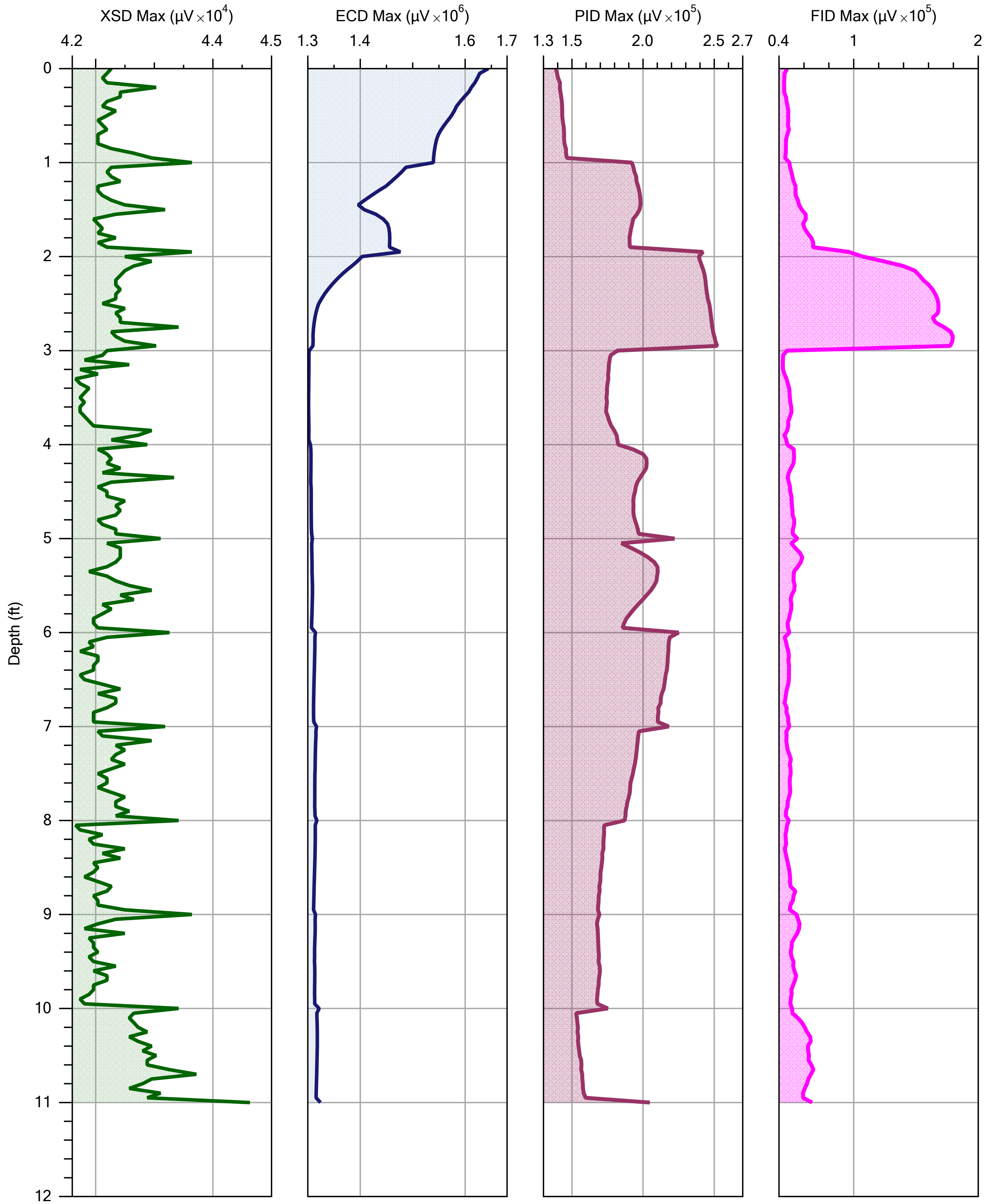
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-18.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 13″ N, 74° 57′ 45″ W



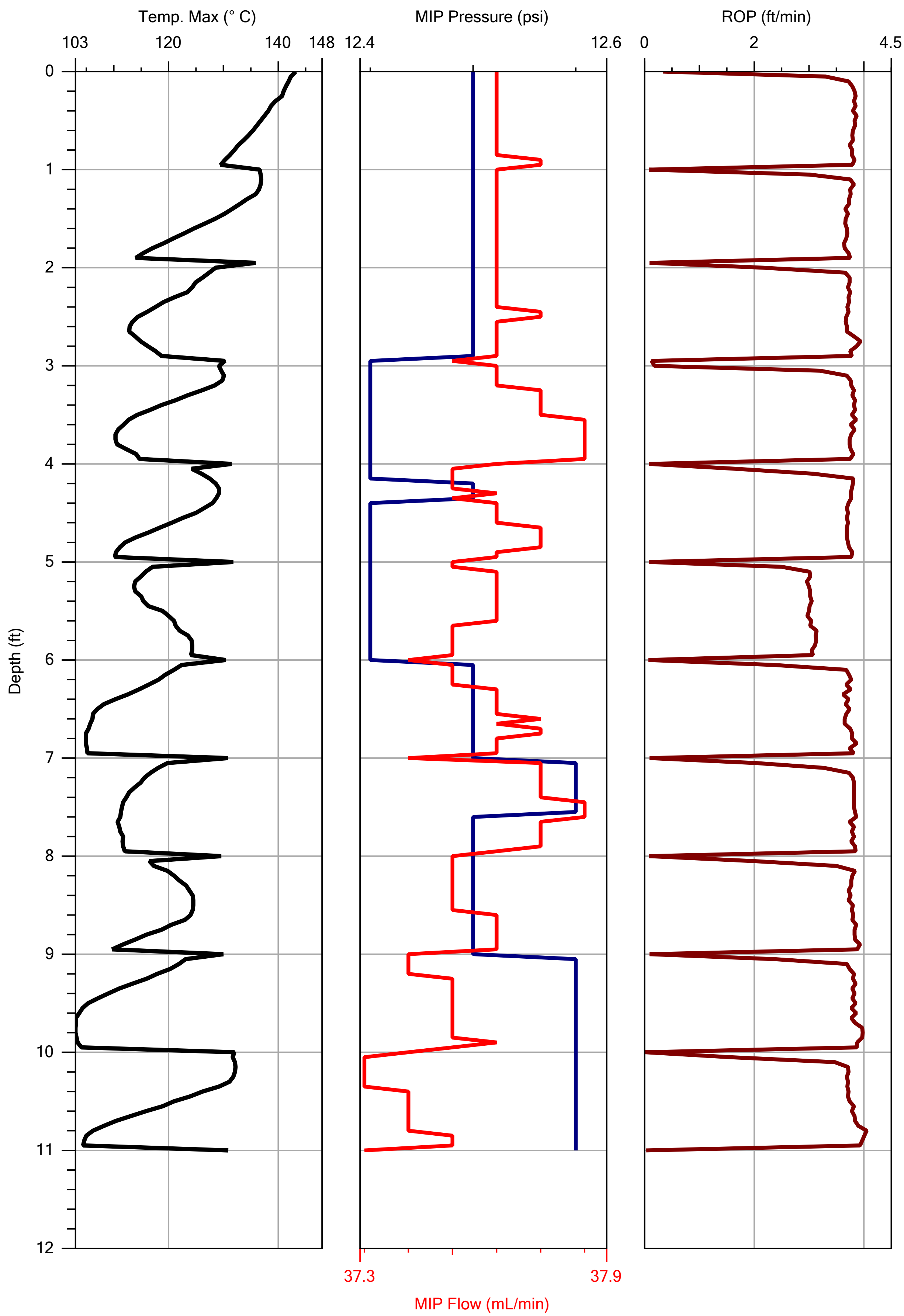
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-18.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 13″ N, 74° 57′ 45″ W



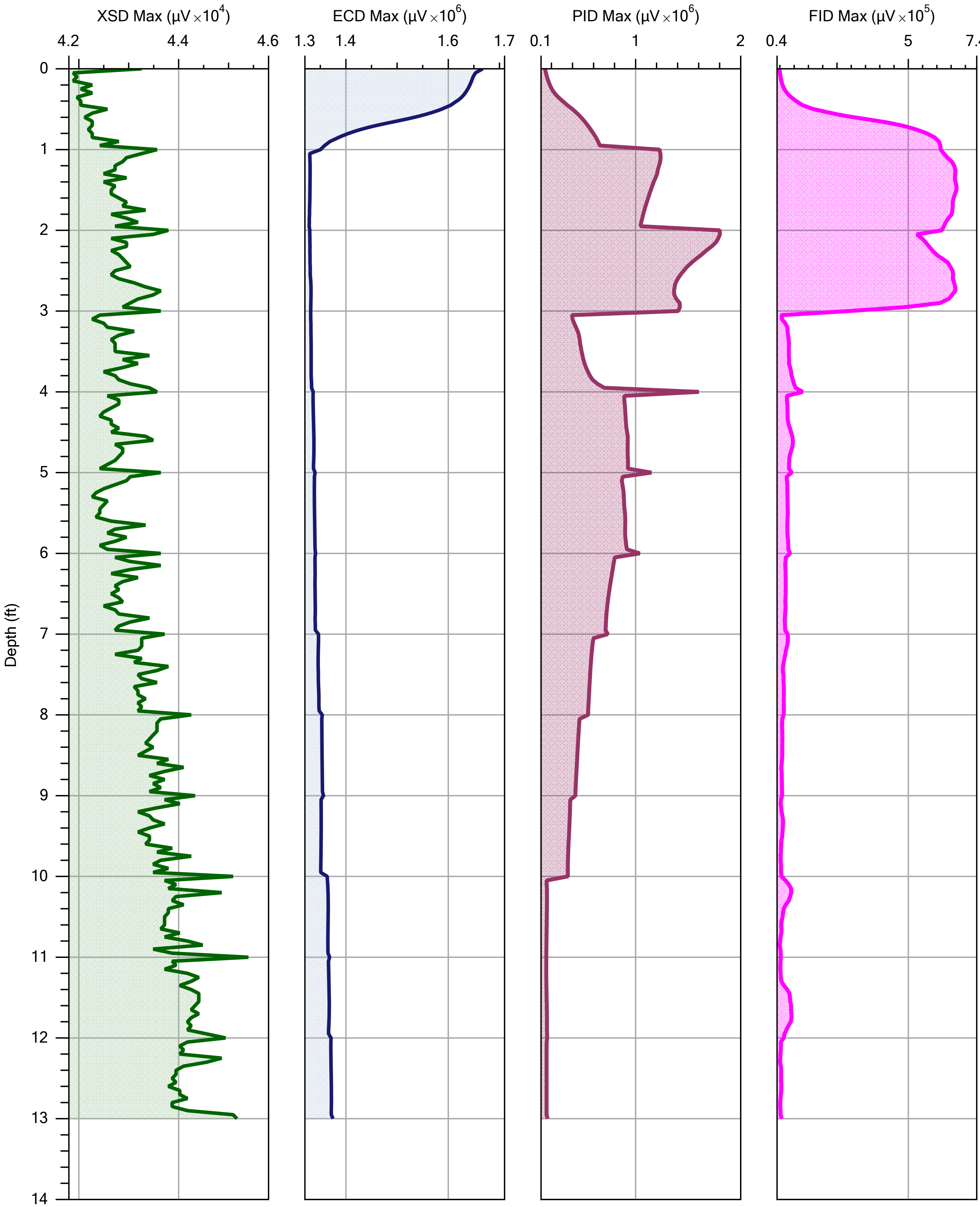
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-09.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 50″ W



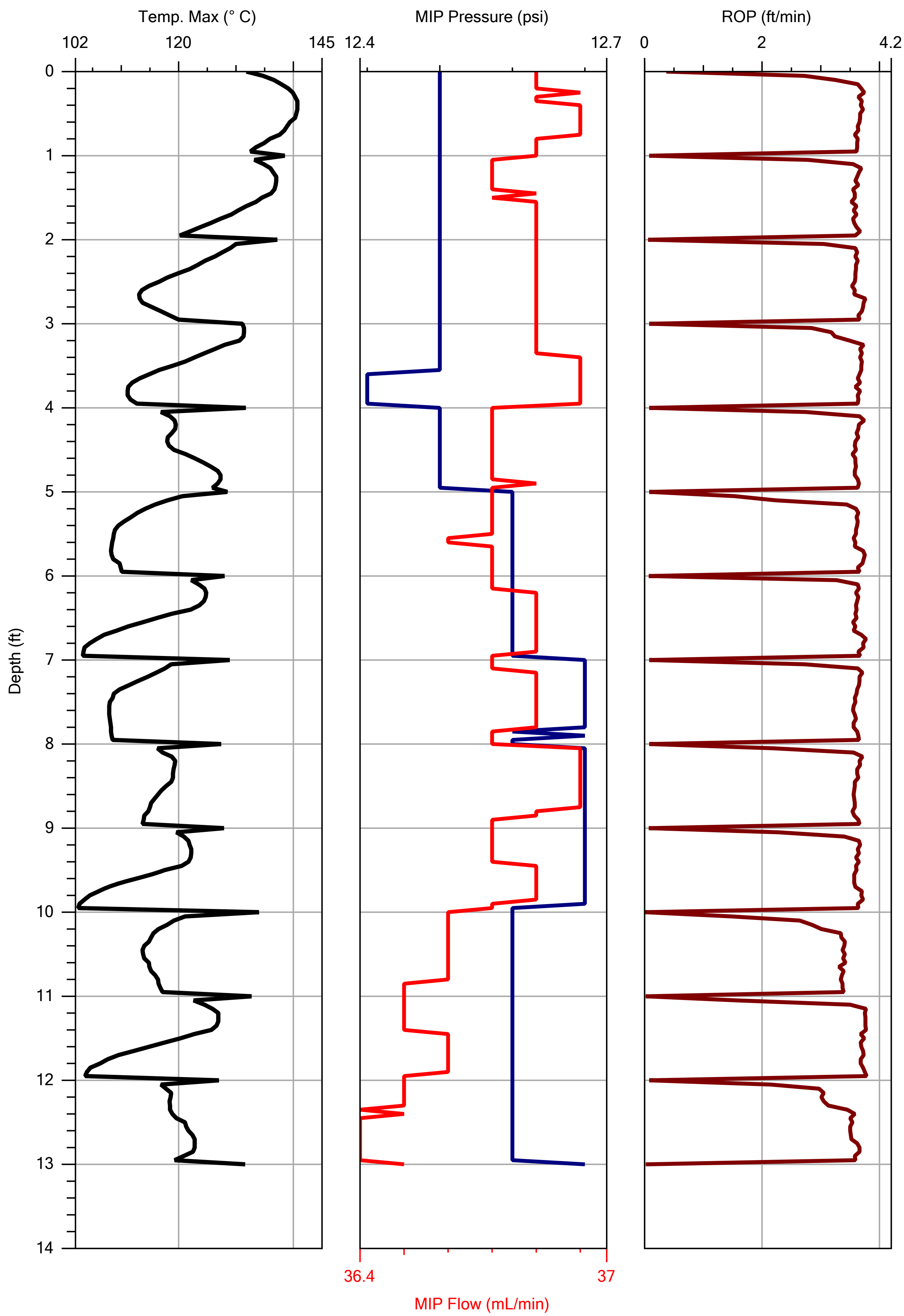
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-09.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 50″ W



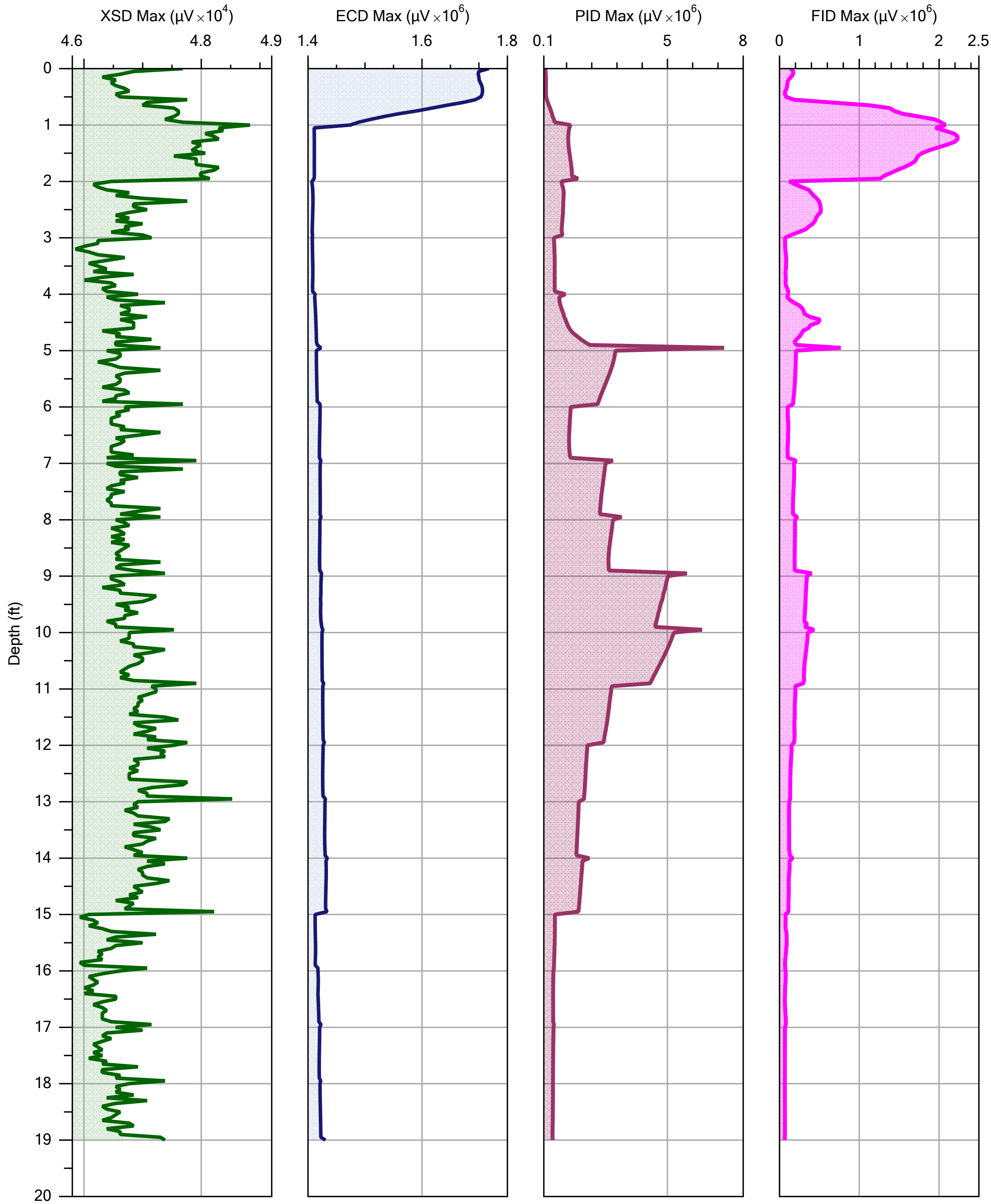
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-10.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 49″ W



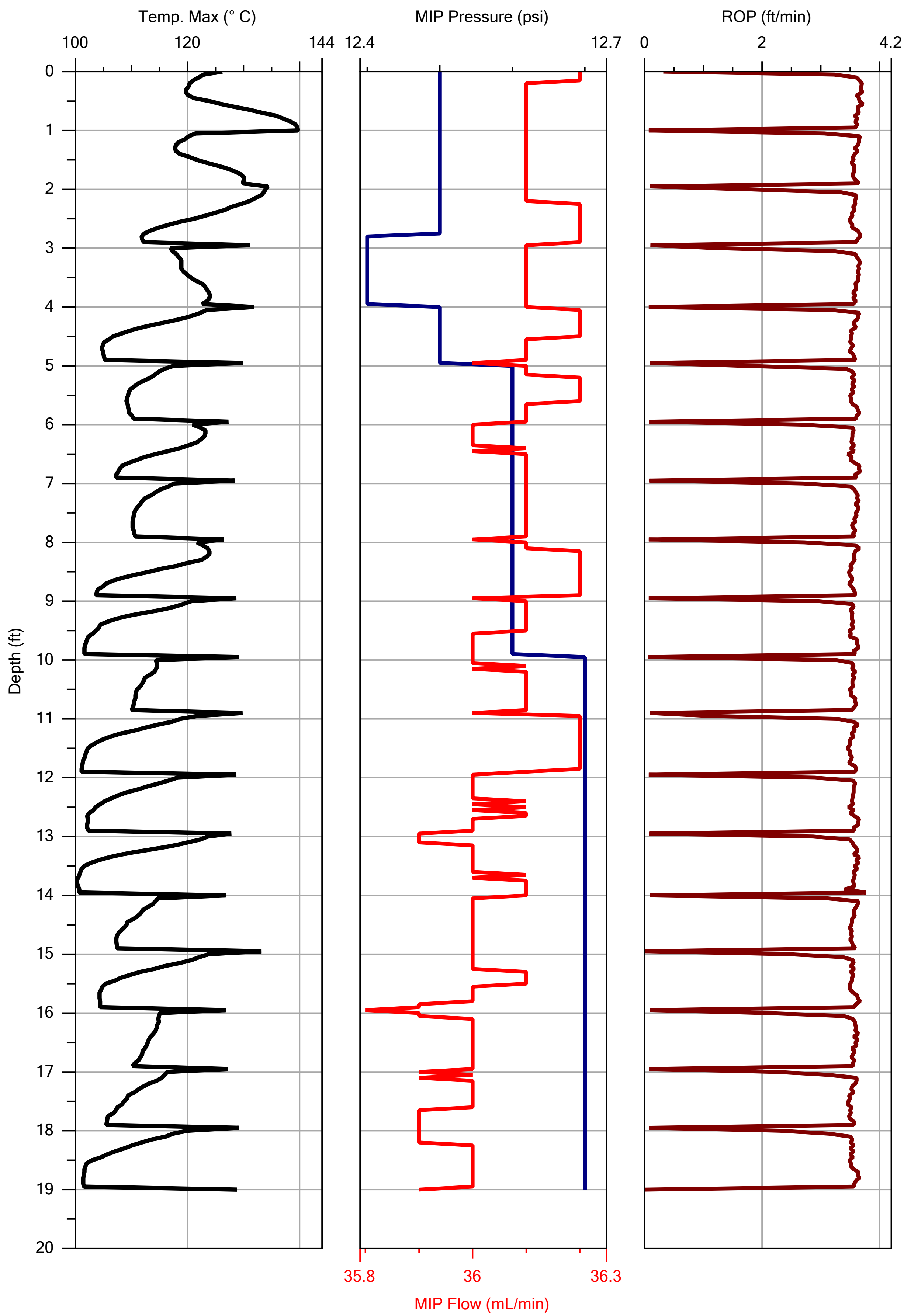
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-10.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 49″ W



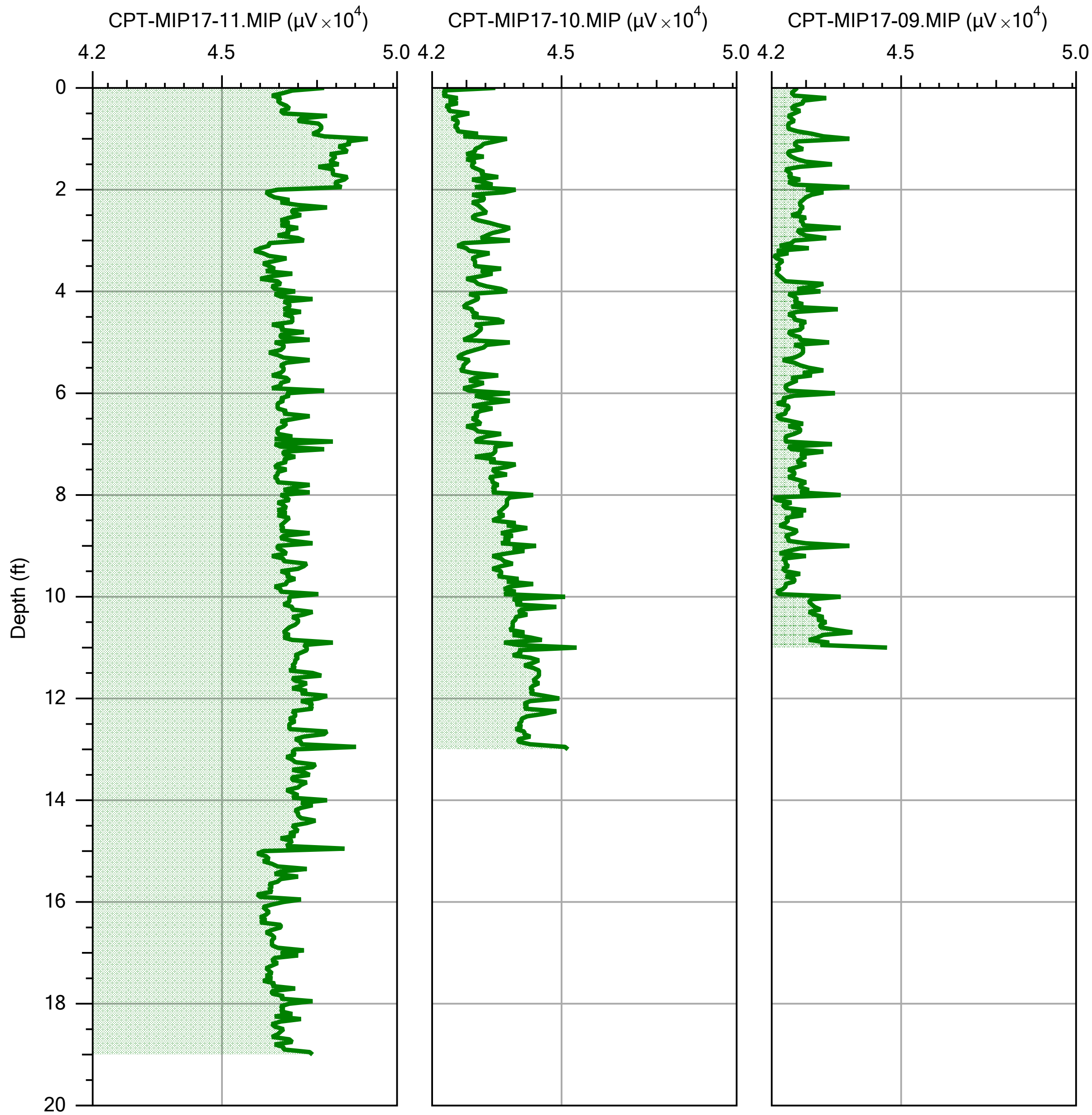
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-11.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 48″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-11.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 12″ N, 74° 57′ 48″ W



ASC

ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

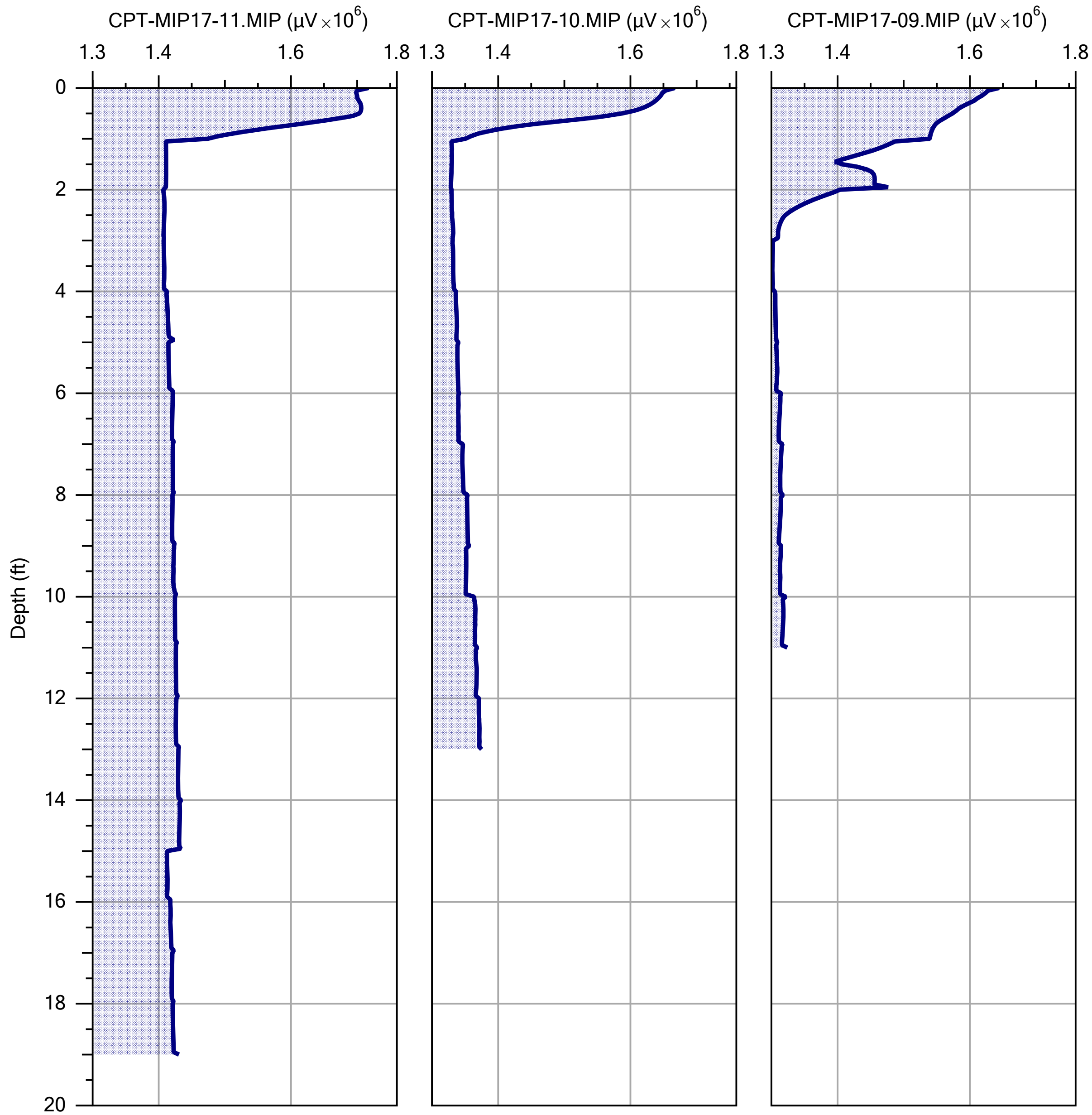
XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

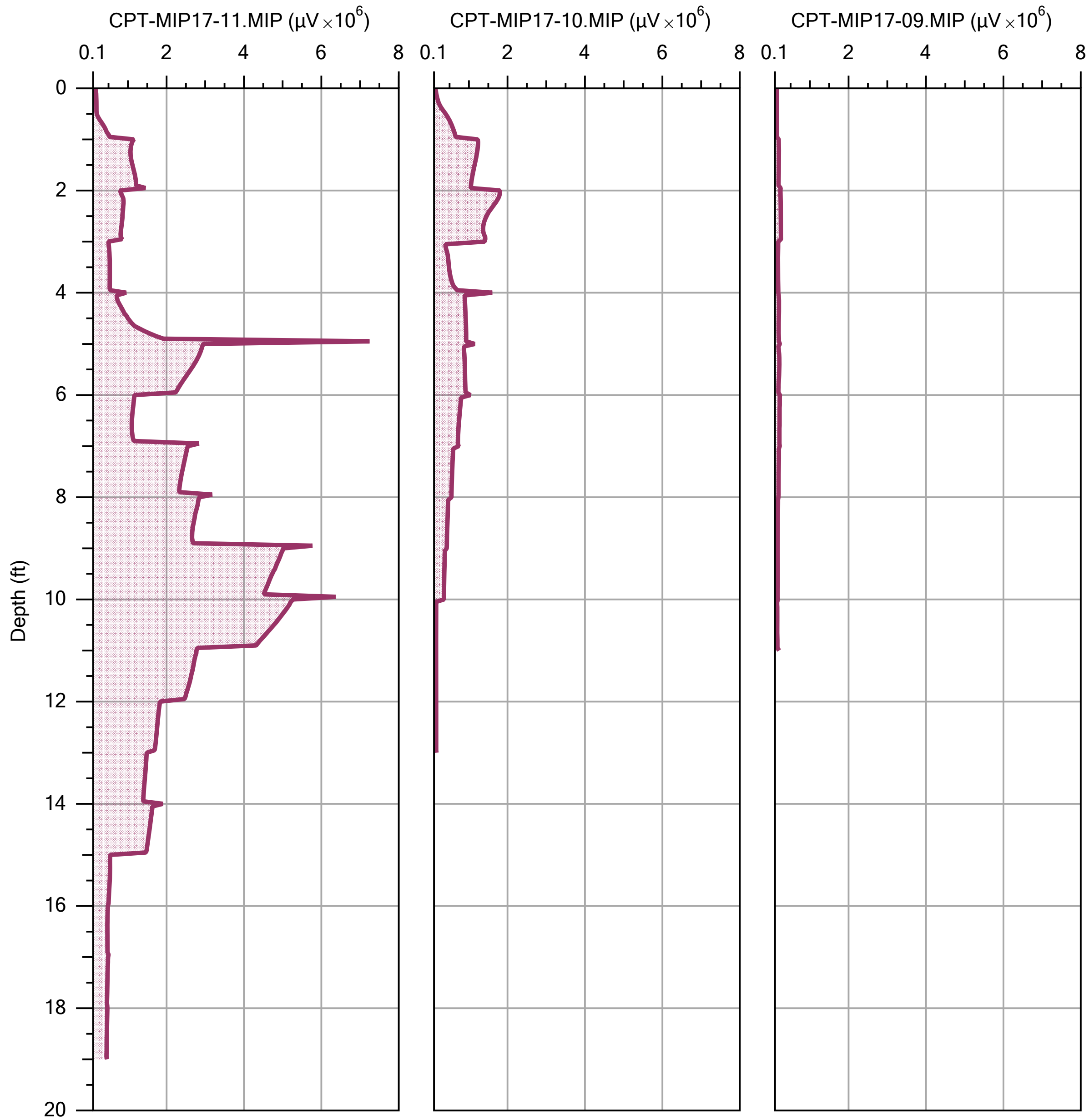
ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

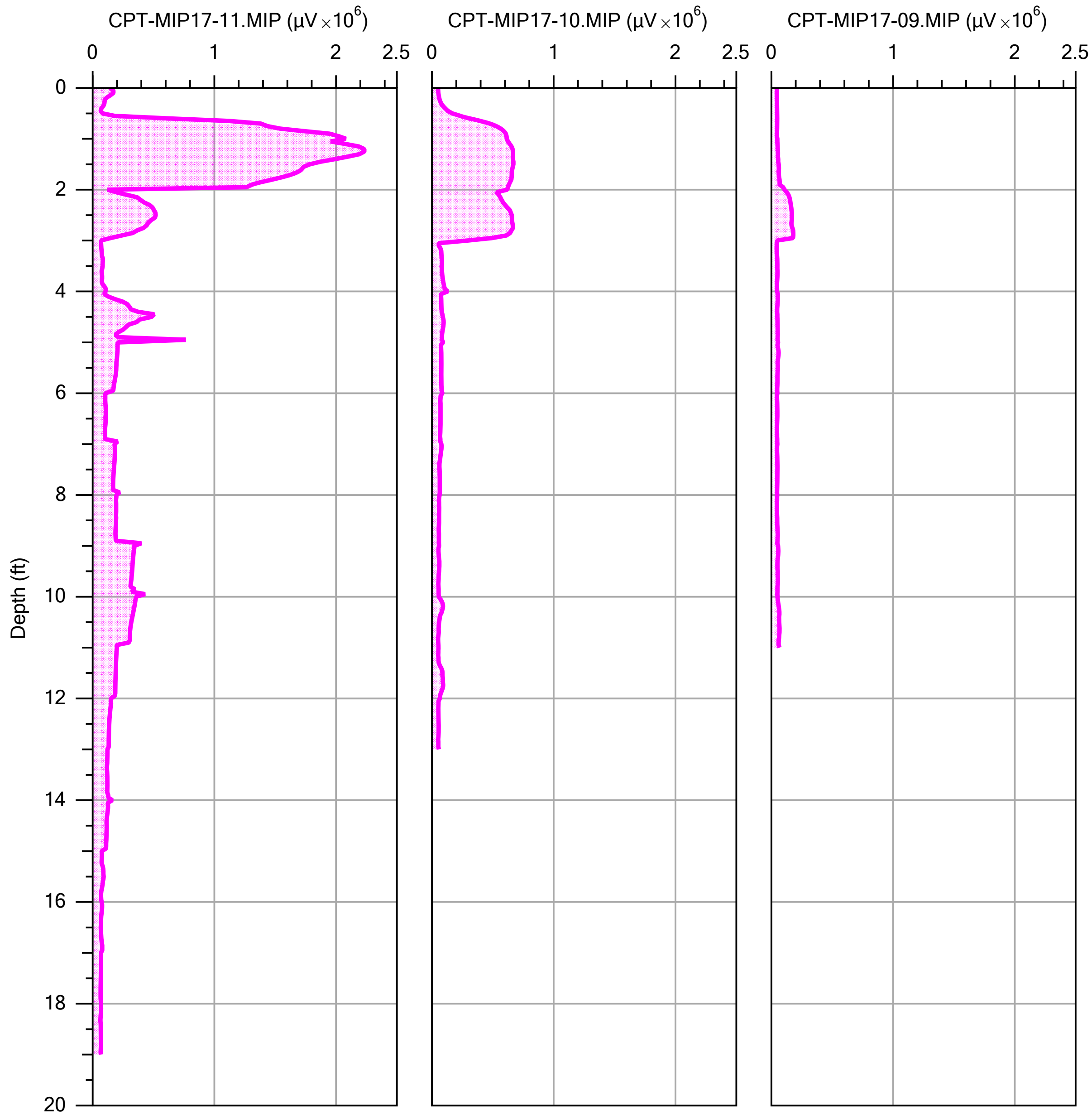
PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

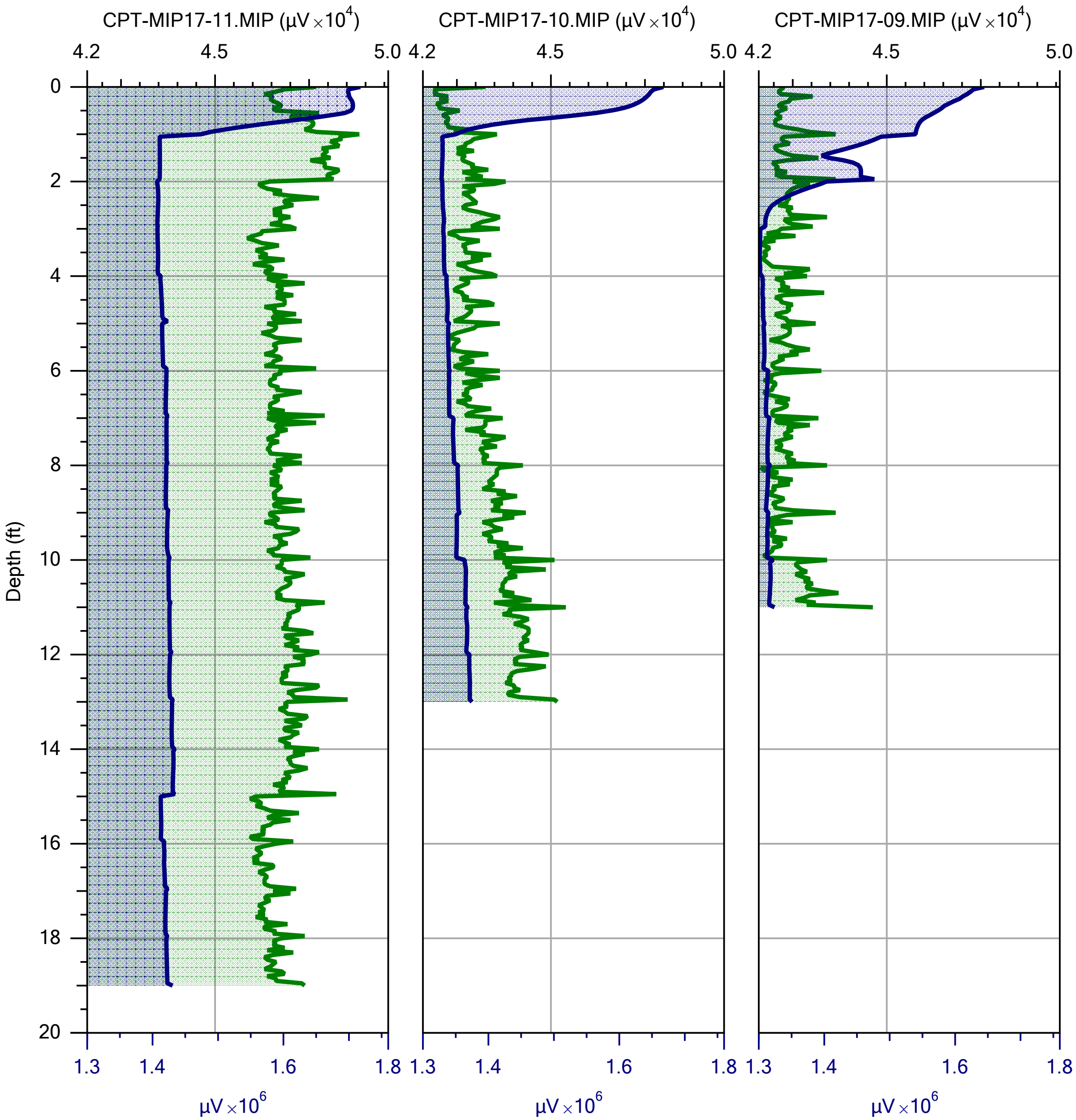
FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

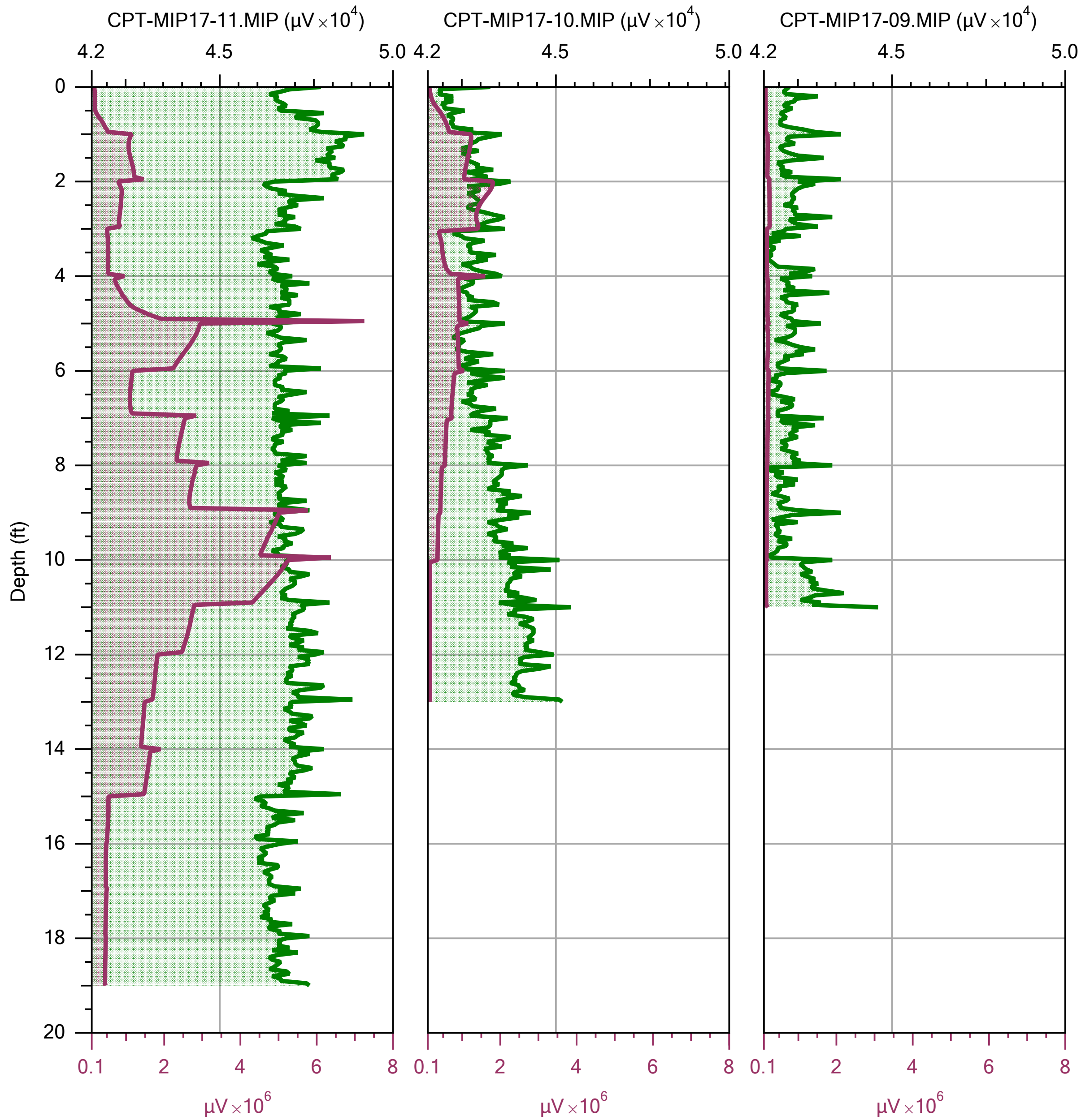
XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

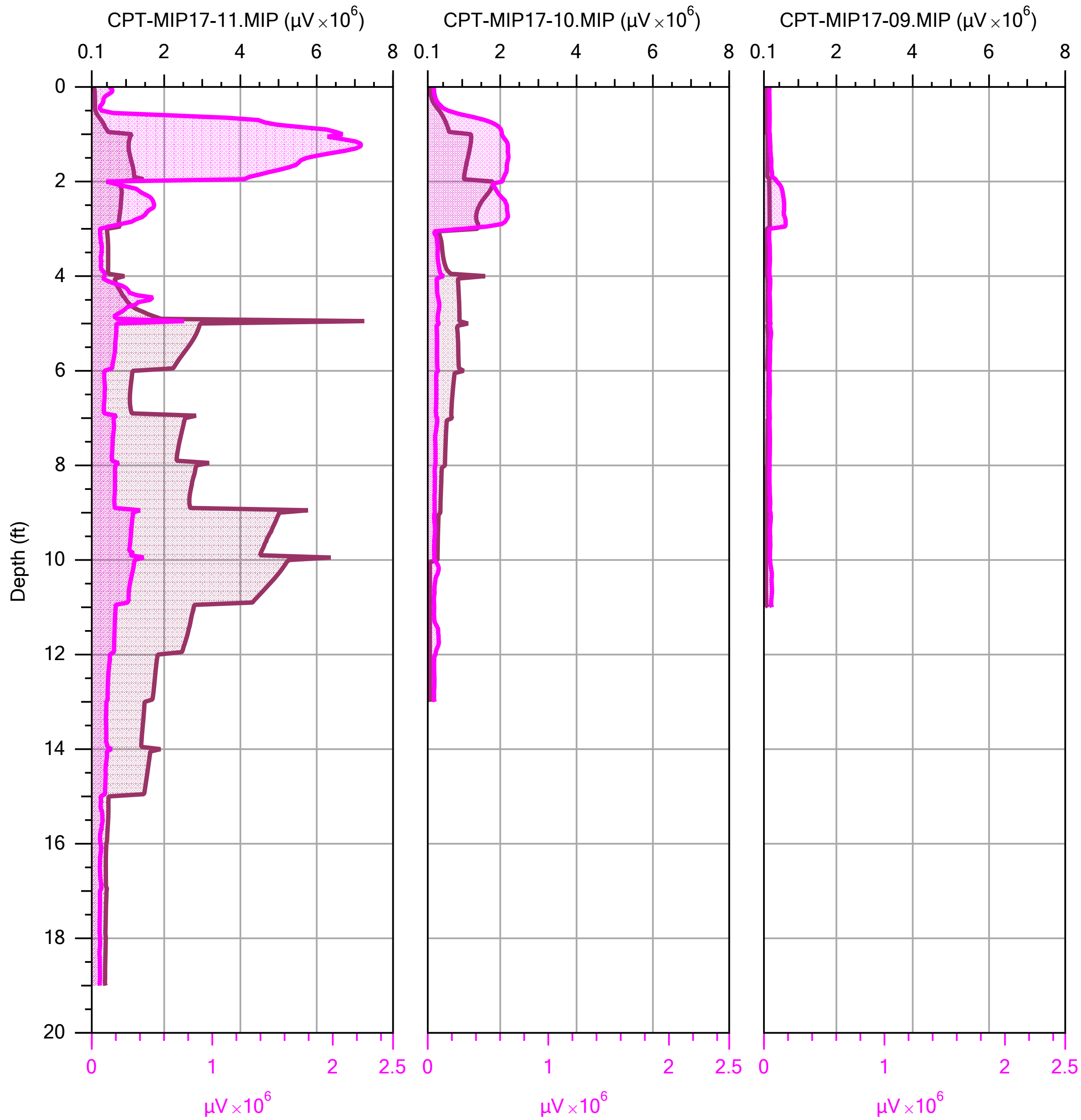
XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

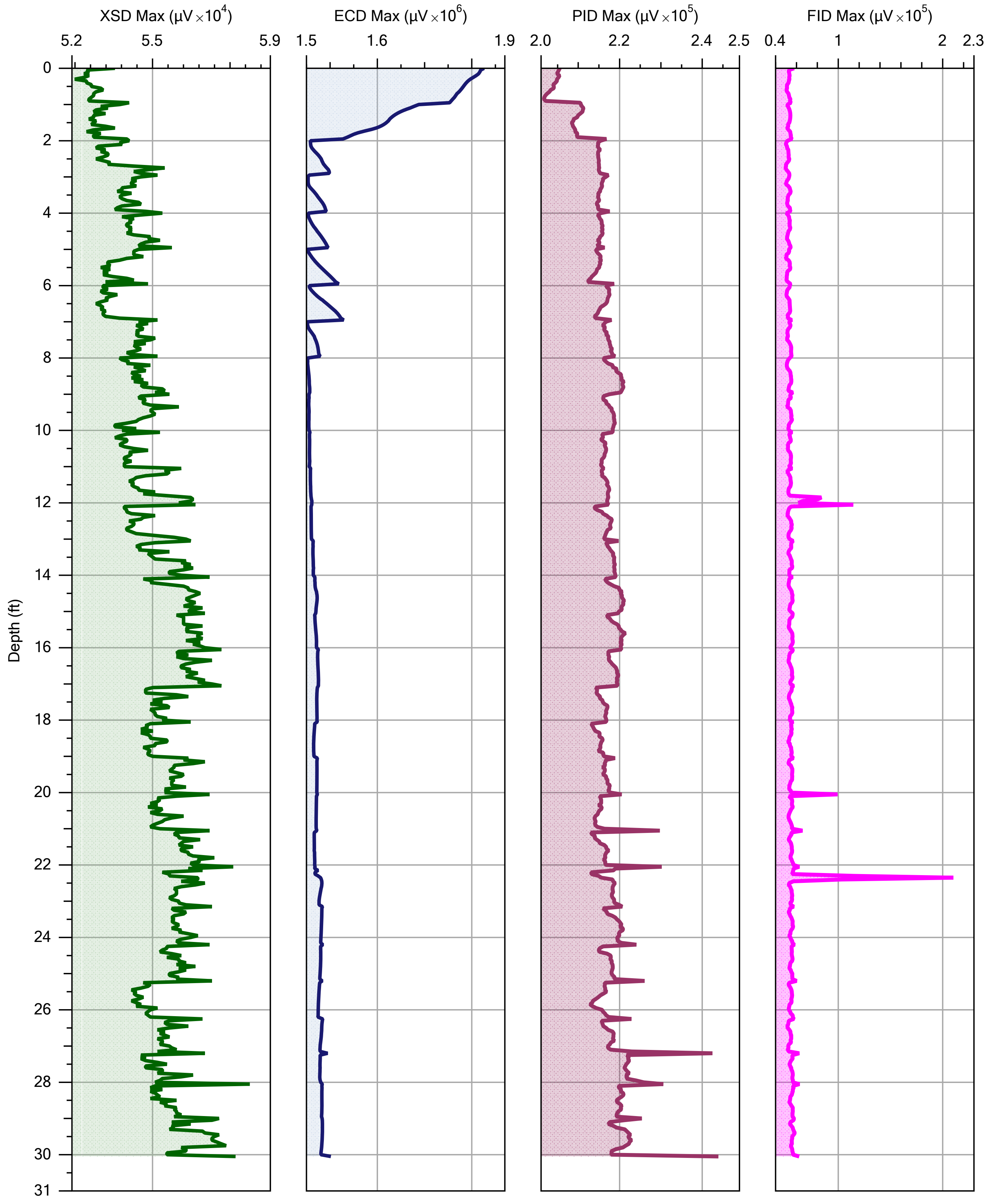
PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-11.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 48″ W

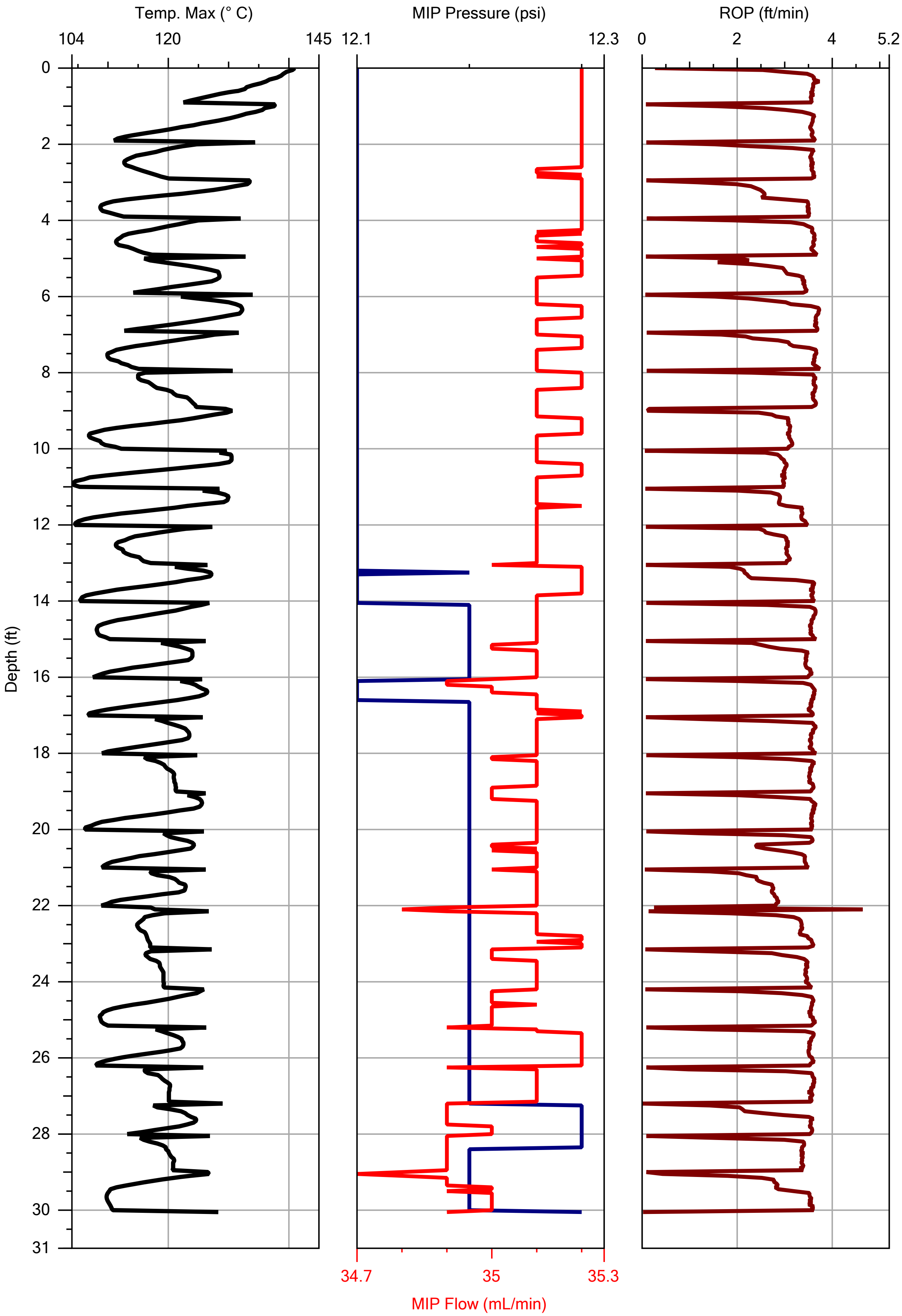
CPT-MIP17-10.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 49″ W

CPT-MIP17-09.MIP 9/21/2017
39° 50′ 12″ N, 74° 57′ 50″ W



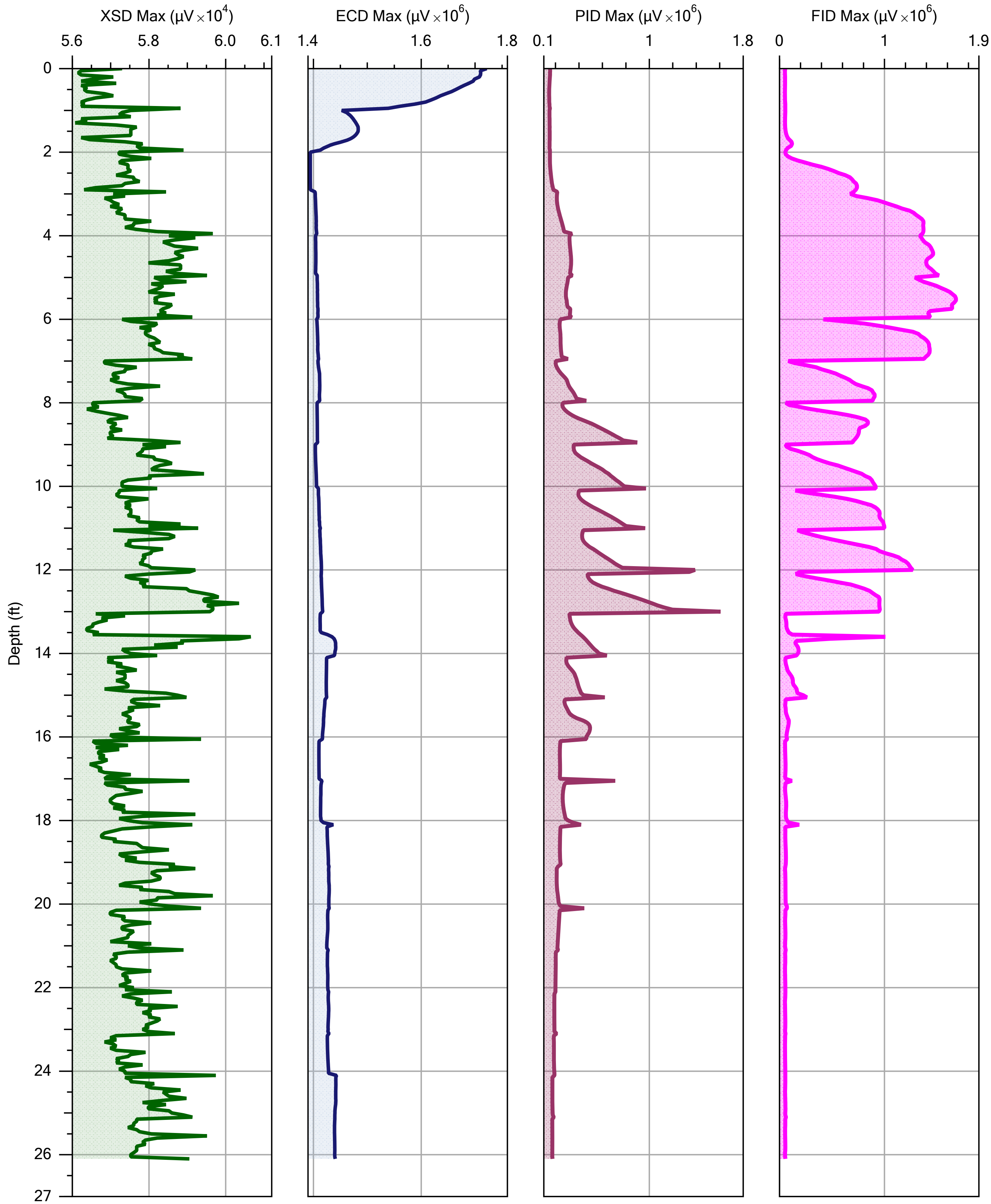
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-01.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



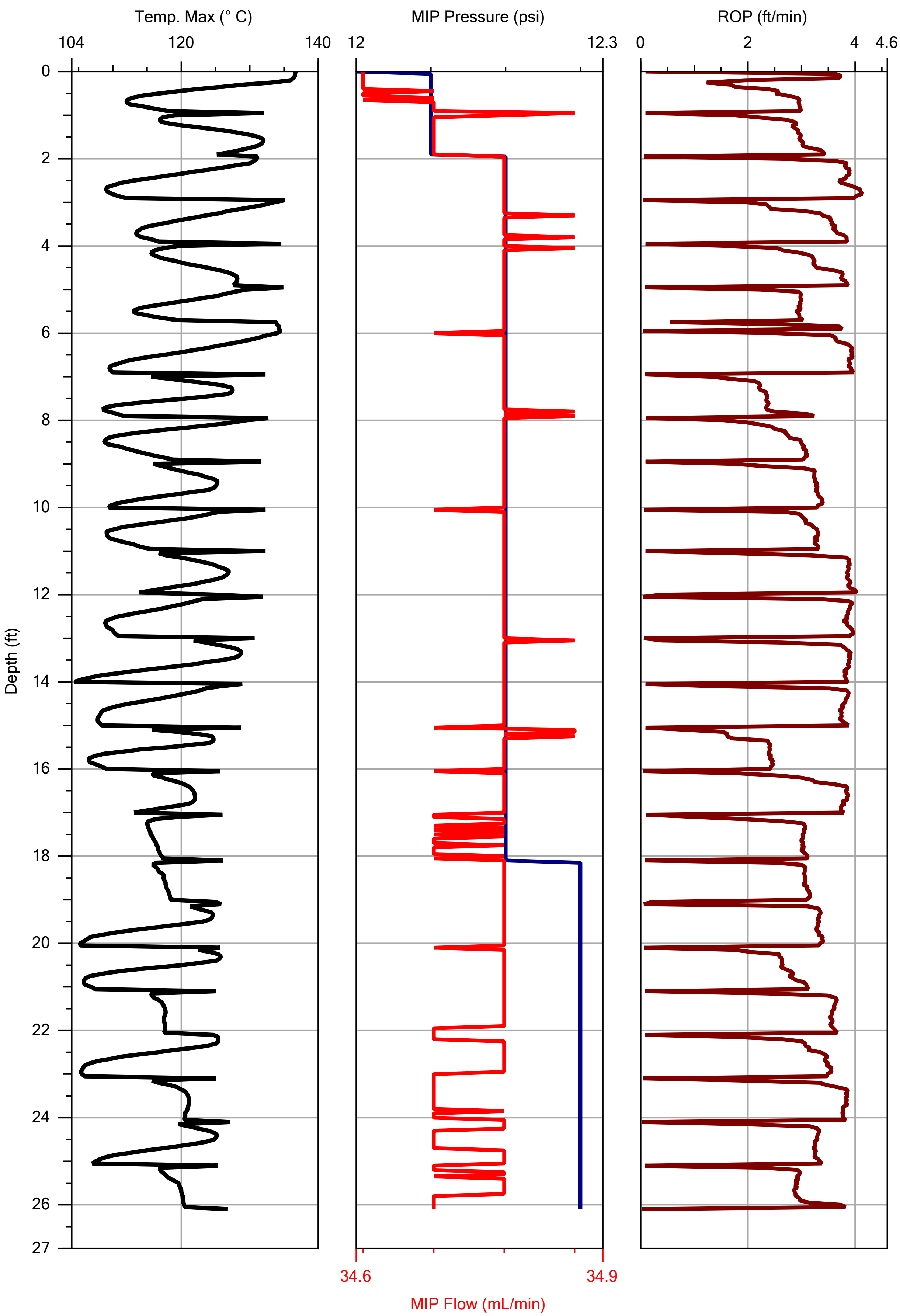
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-01.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



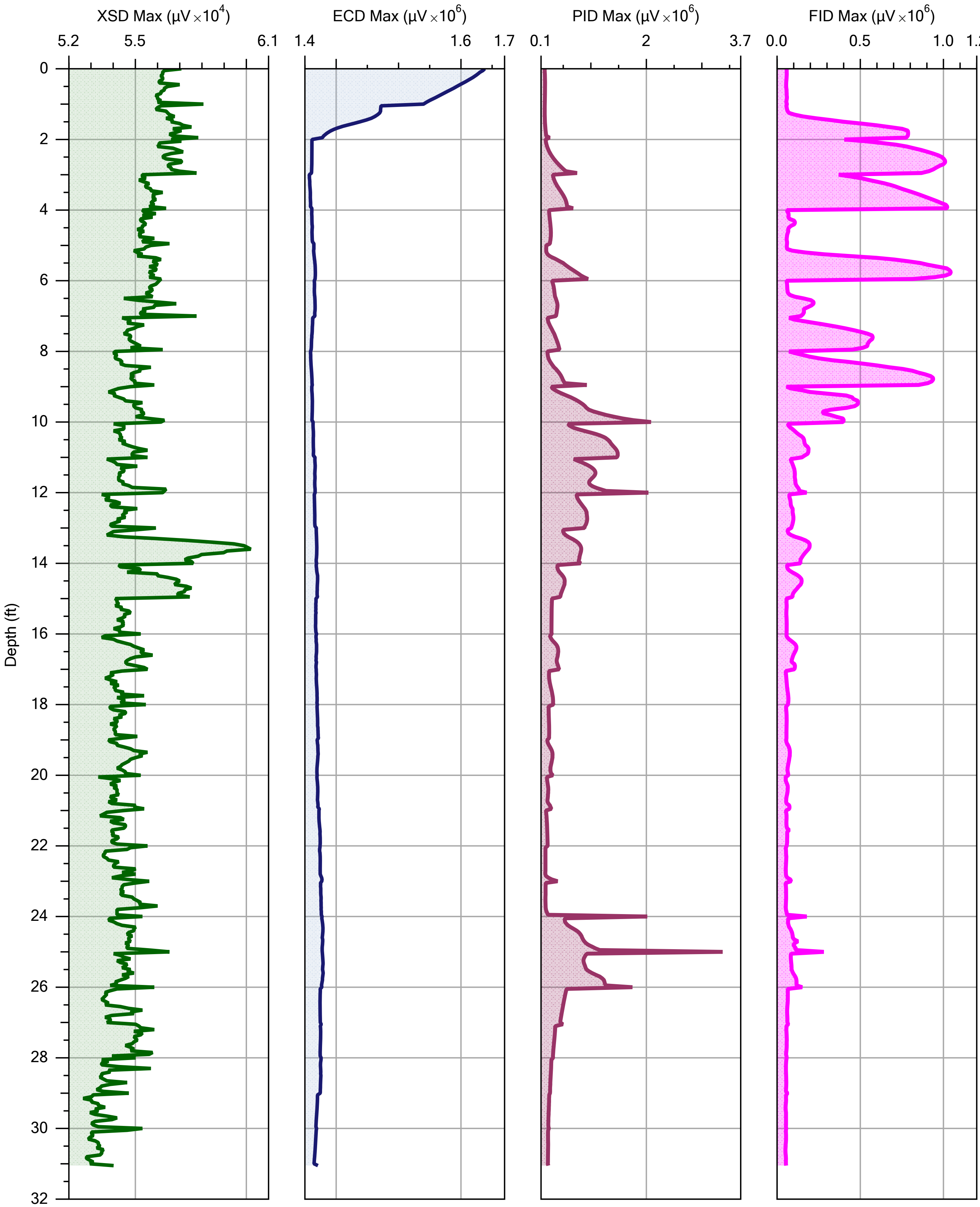
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-02.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



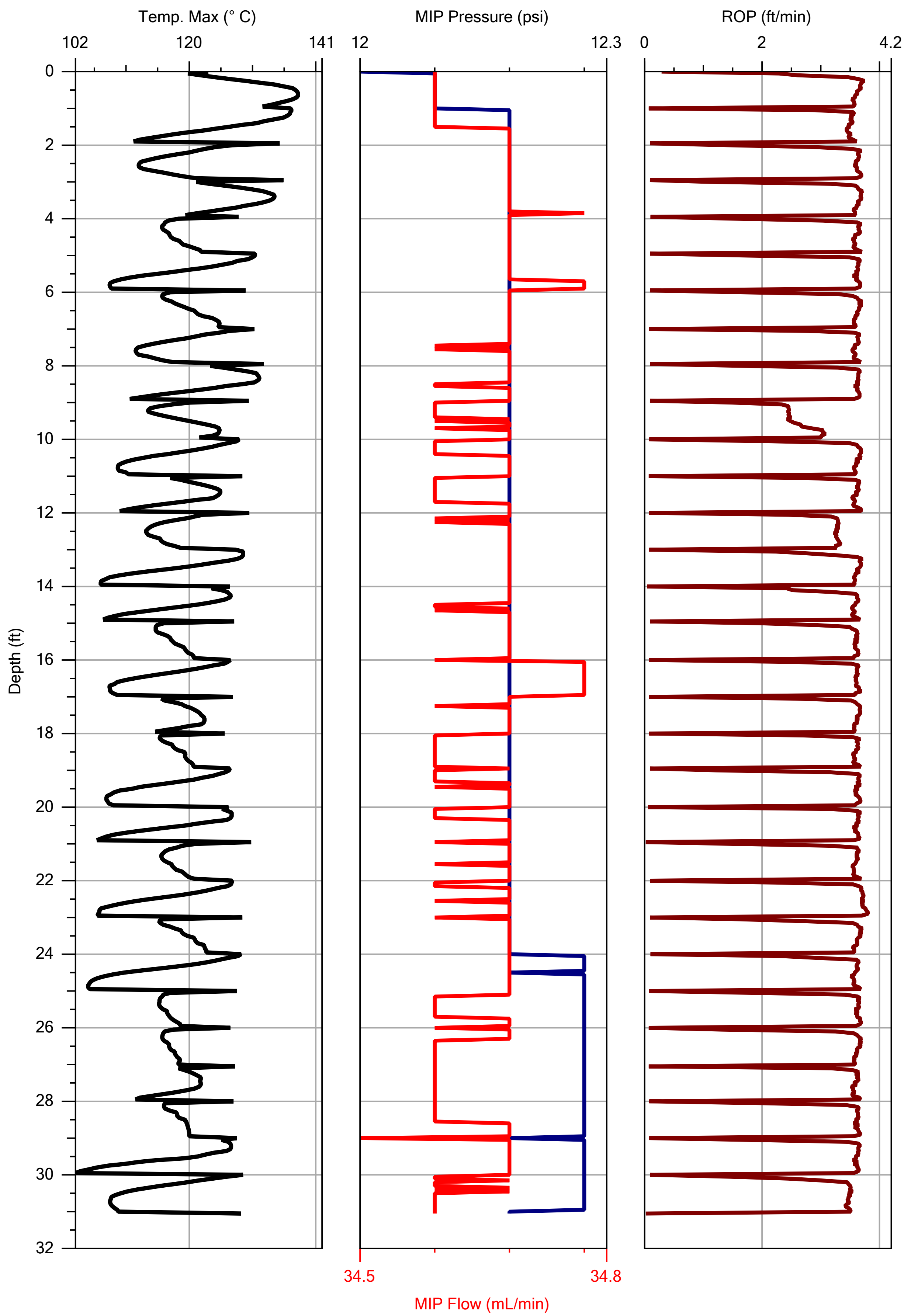
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-02.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



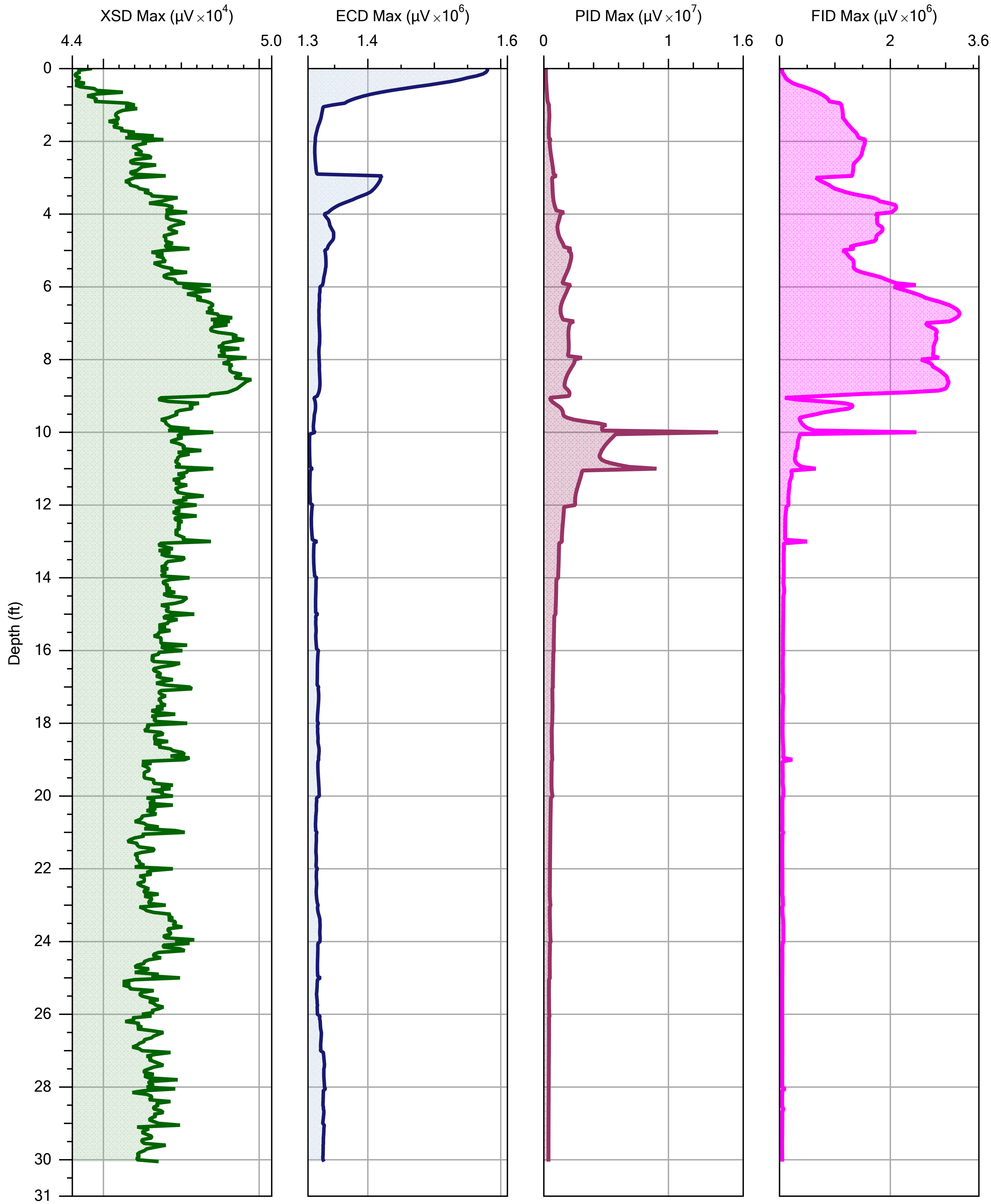
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-03.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 74° 57′ 44″ W



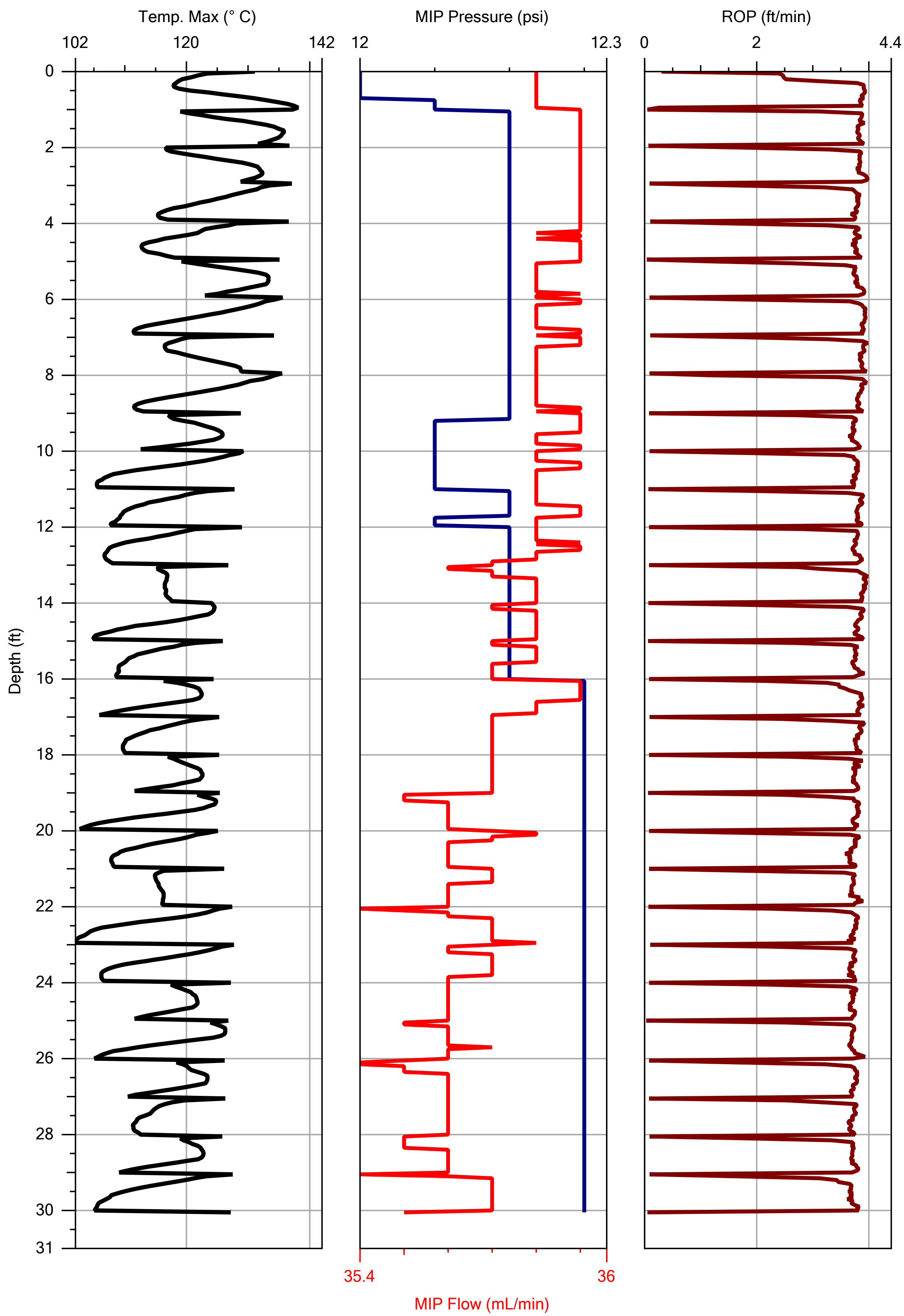
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-03.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/19/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 74° 57′ 44″ W



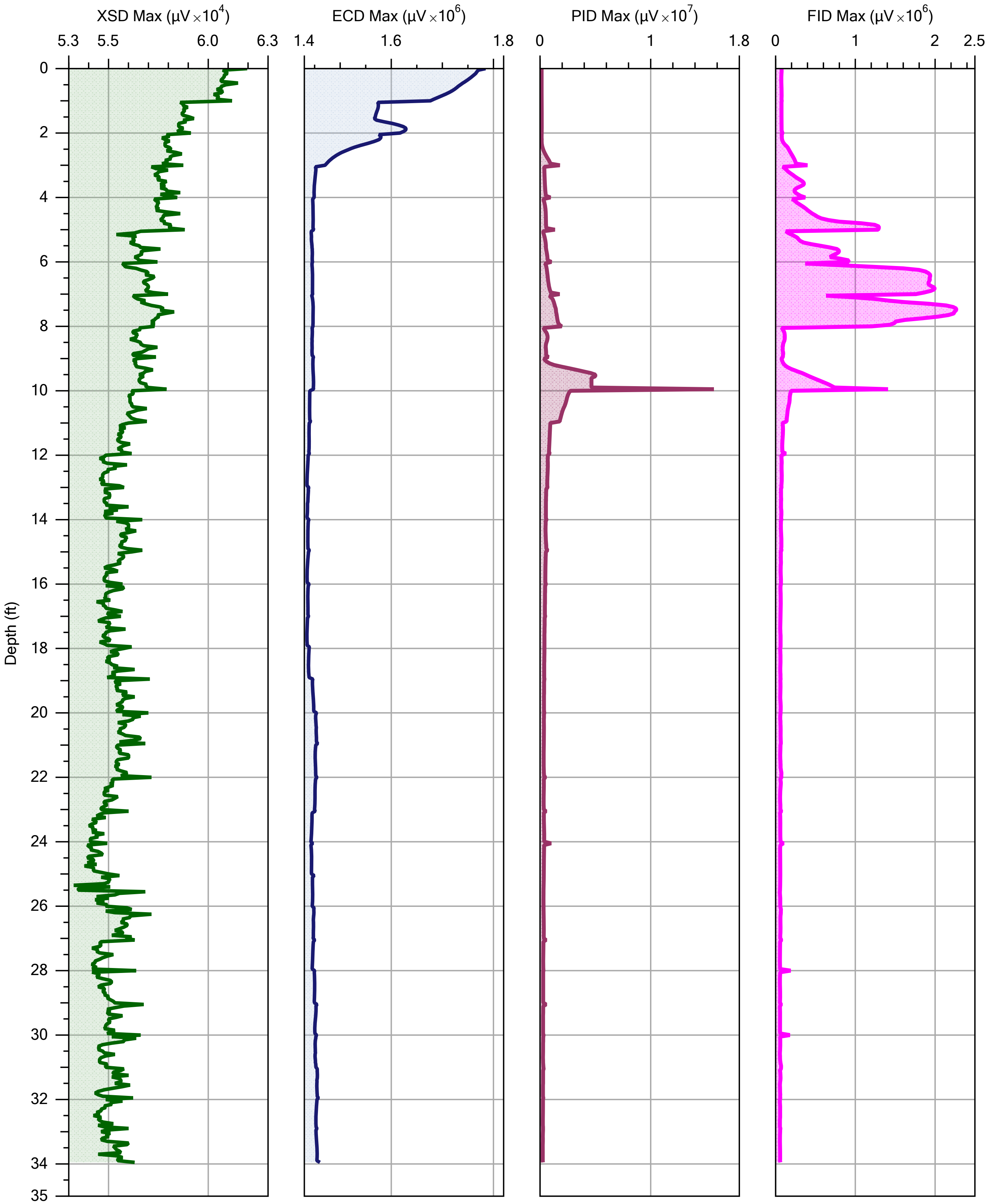
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-04.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



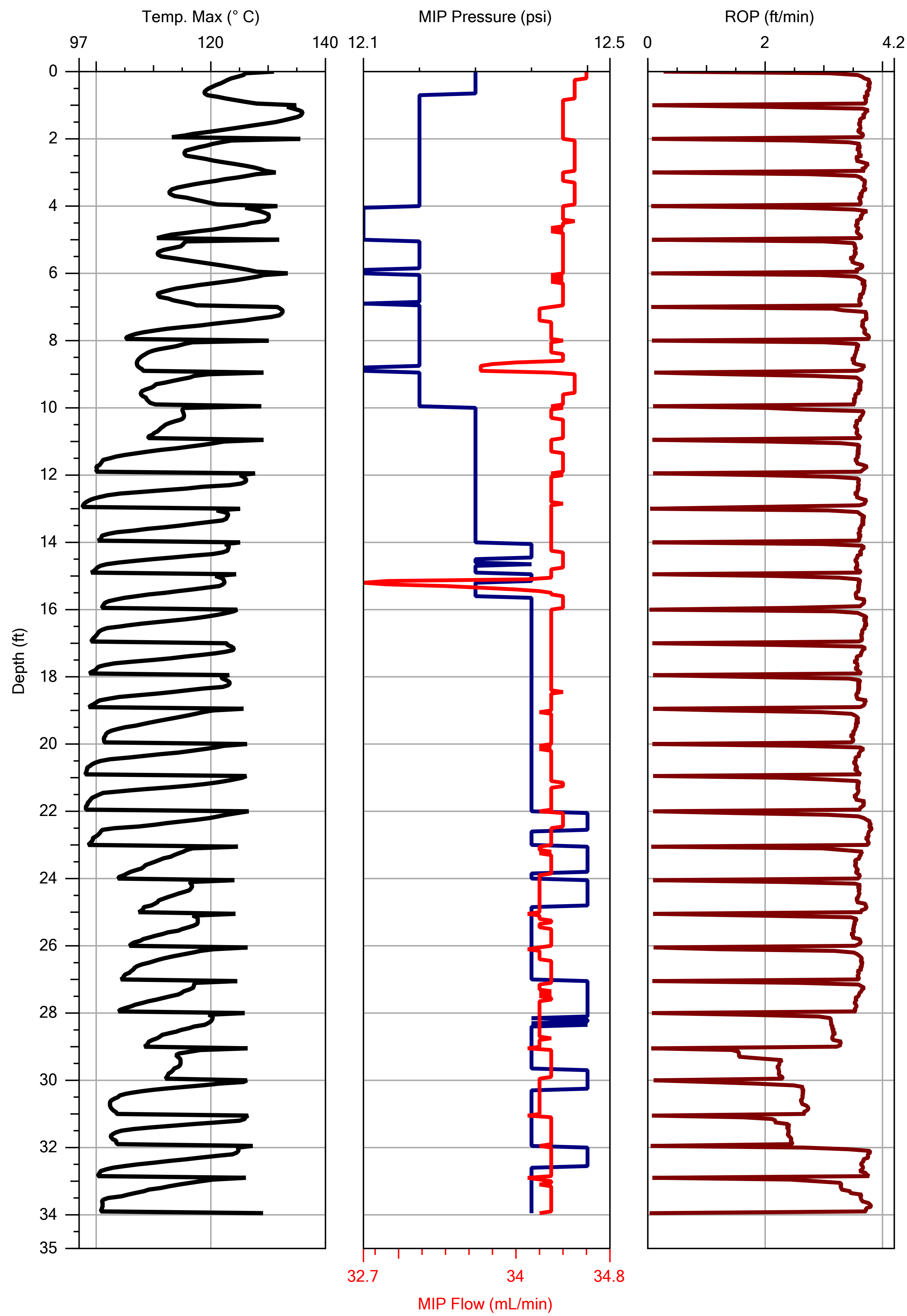
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-04.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 44″ W



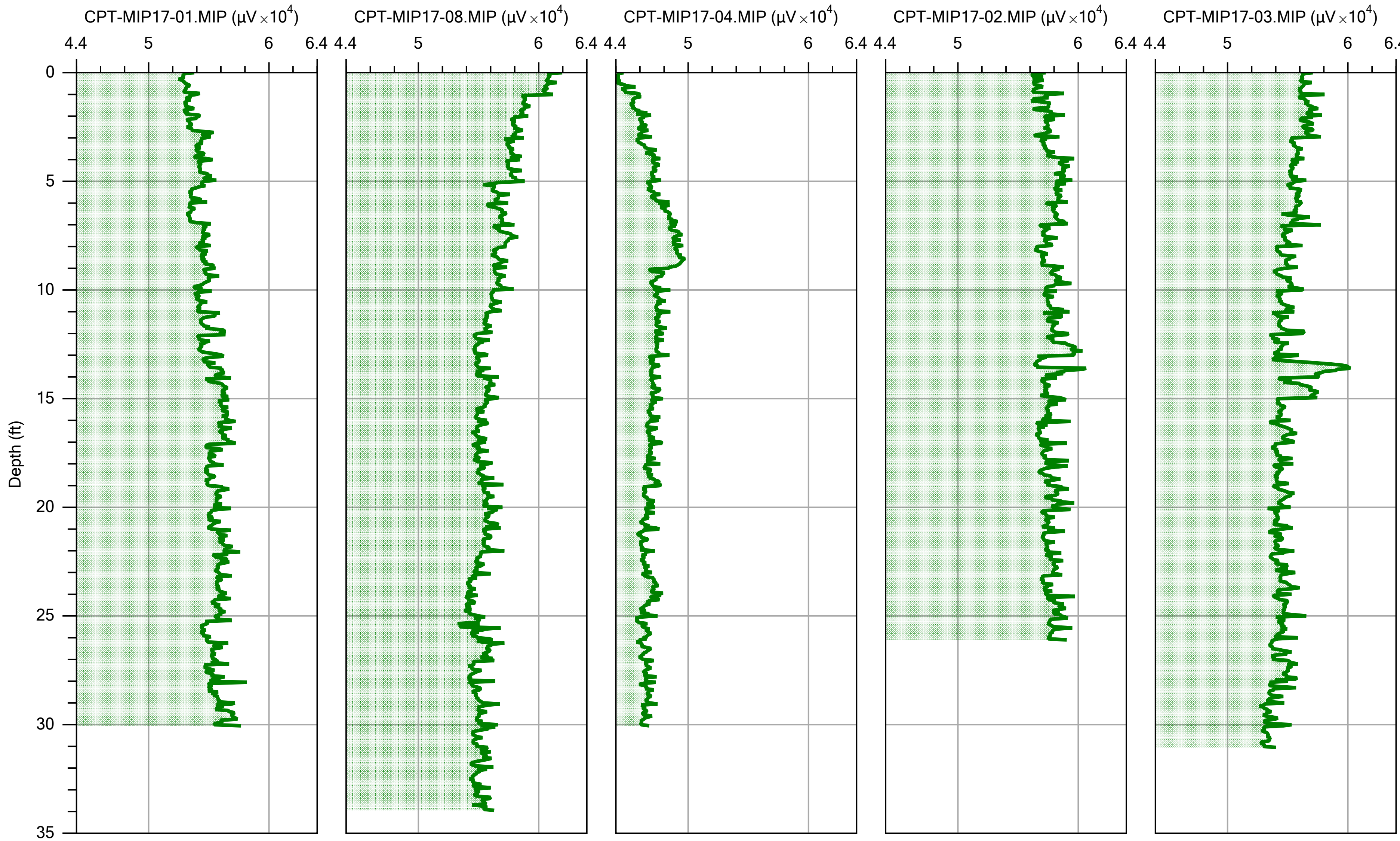
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-08.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 79° 57′ 45″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-08.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 79° 57′ 45″ W



CPT-MIP17-01.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-08.MIP 9/20/2017
39° 50′ 14″ N, 79° 57′ 45″ W

CPT-MIP17-04.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-02.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-03.MIP 9/19/2017
39° 50′ 14″ N, 74° 57′ 44″ W

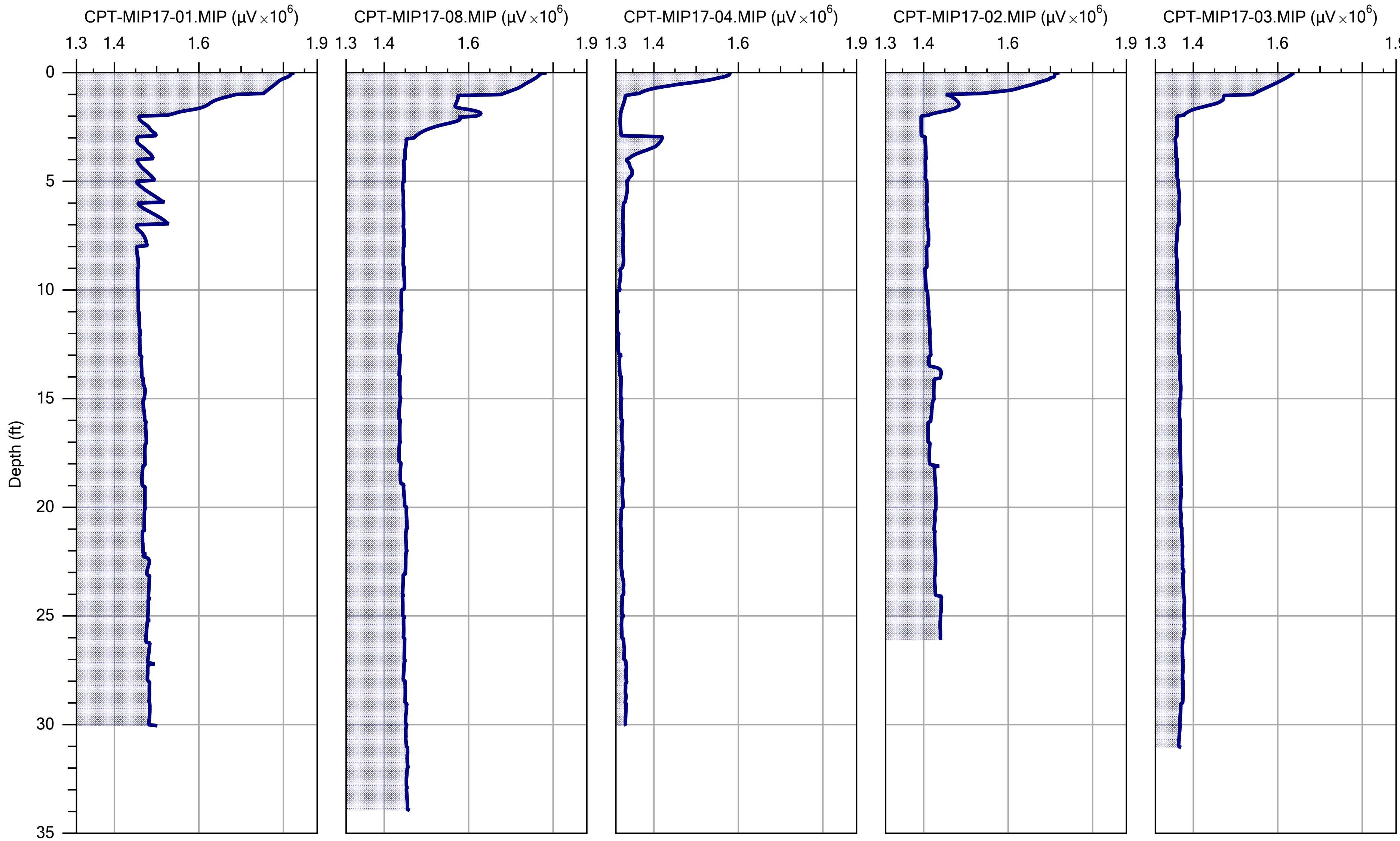
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-01.MIP 9/19/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-08.MIP 9/20/2017	39° 50′ 14″ N, 79° 57′ 45″ W
CPT-MIP17-04.MIP 9/20/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-02.MIP 9/19/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-03.MIP 9/19/2017	39° 50′ 14″ N, 74° 57′ 44″ W

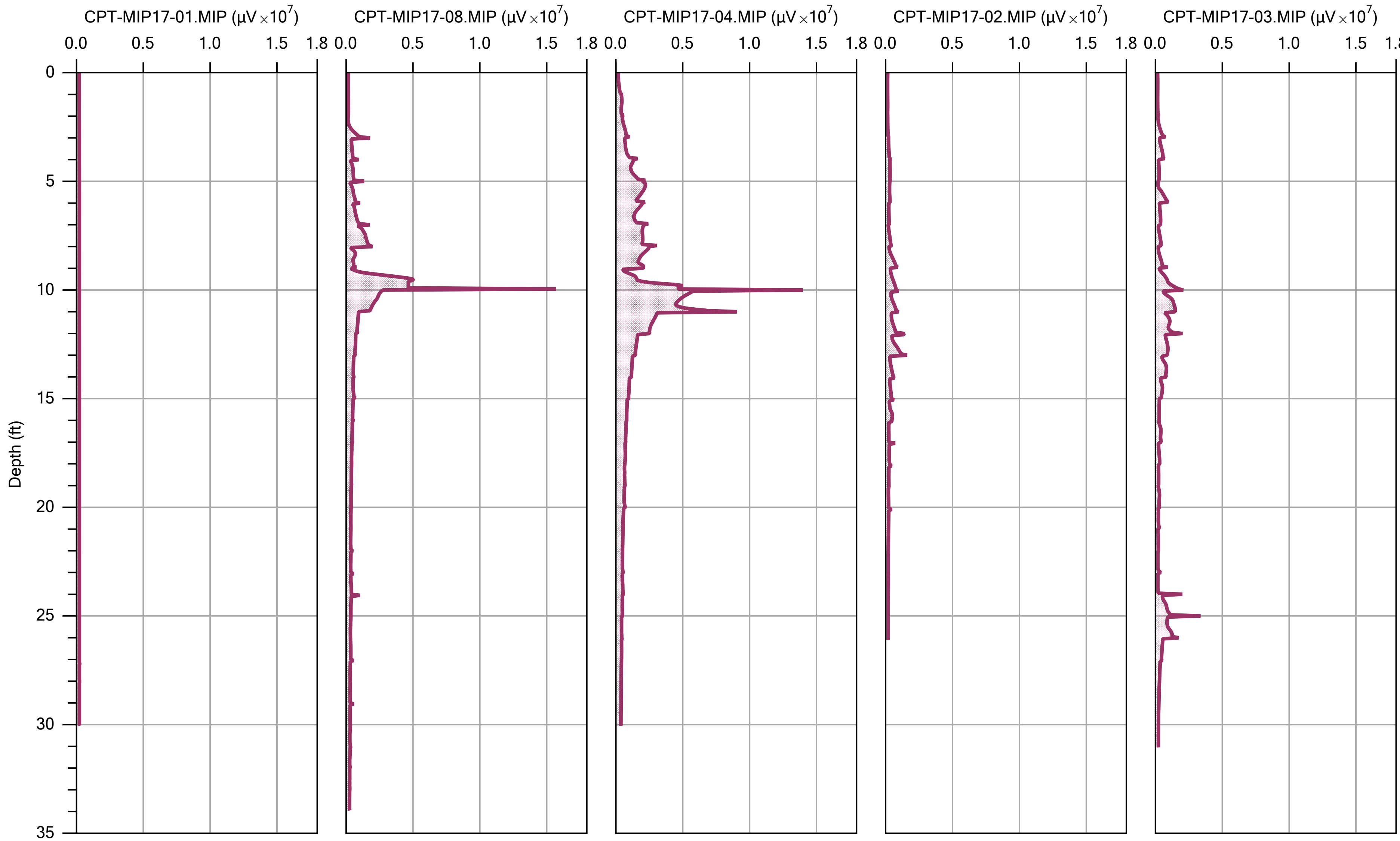
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-01.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-08.MIP 9/20/2017
39° 50′ 14″ N, 79° 57′ 45″ W

CPT-MIP17-04.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-02.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-03.MIP 9/19/2017
39° 50′ 14″ N, 74° 57′ 44″ W

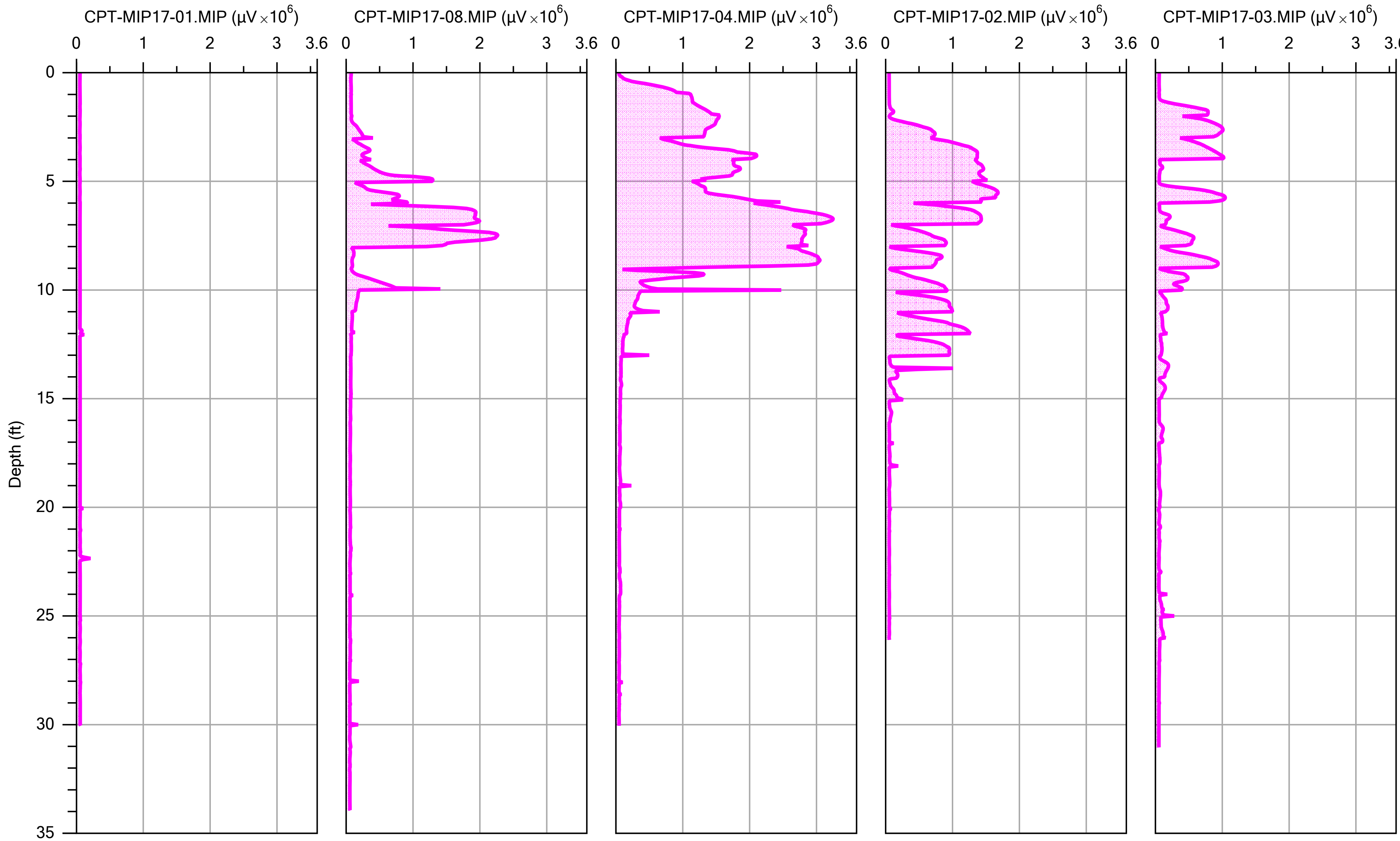
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-01.MIP 9/19/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-08.MIP 9/20/2017	39° 50′ 14″ N, 79° 57′ 45″ W
CPT-MIP17-04.MIP 9/20/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-02.MIP 9/19/2017	39° 50′ 15″ N, 74° 57′ 44″ W
CPT-MIP17-03.MIP 9/19/2017	39° 50′ 14″ N, 74° 57′ 44″ W

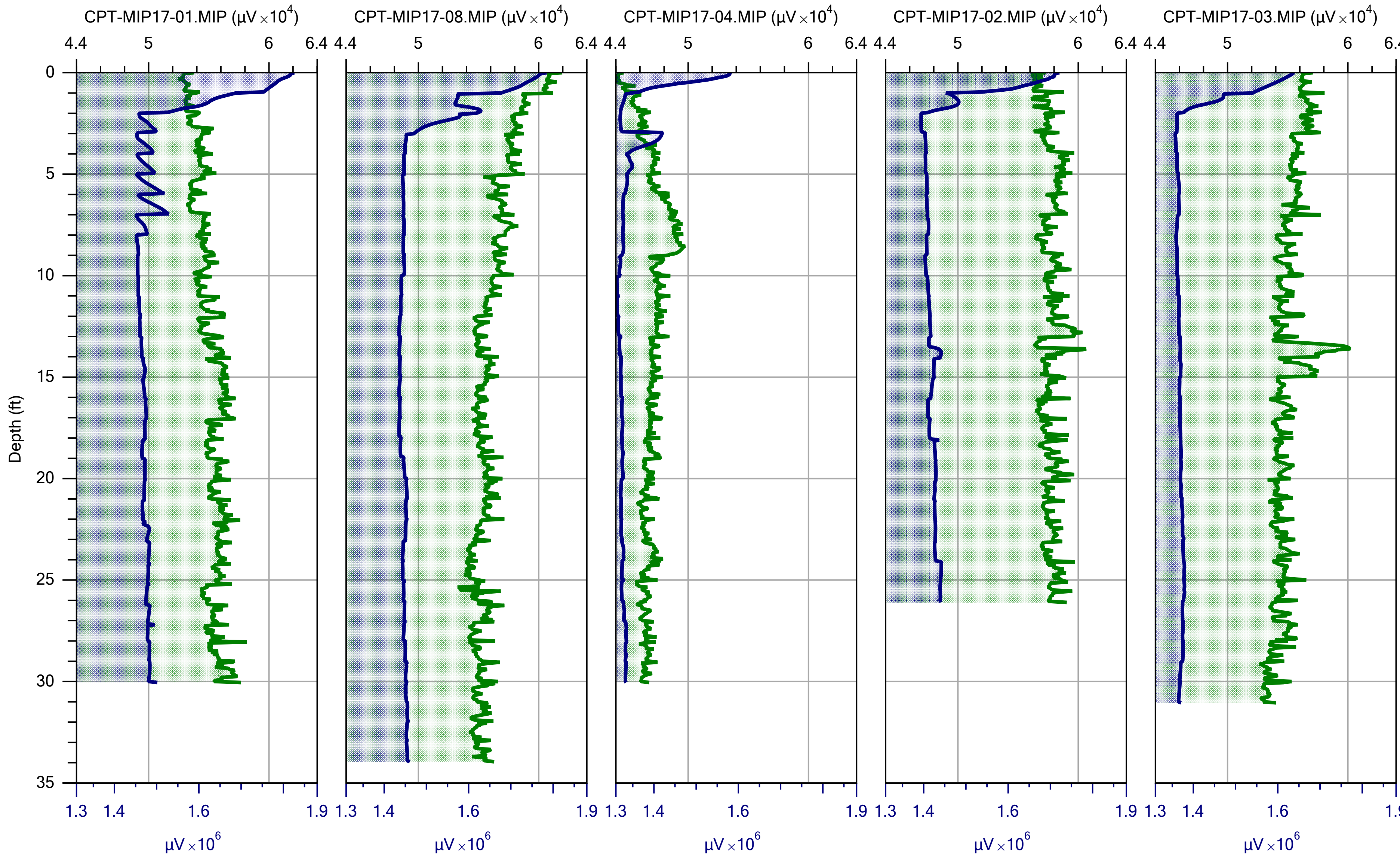
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC

ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

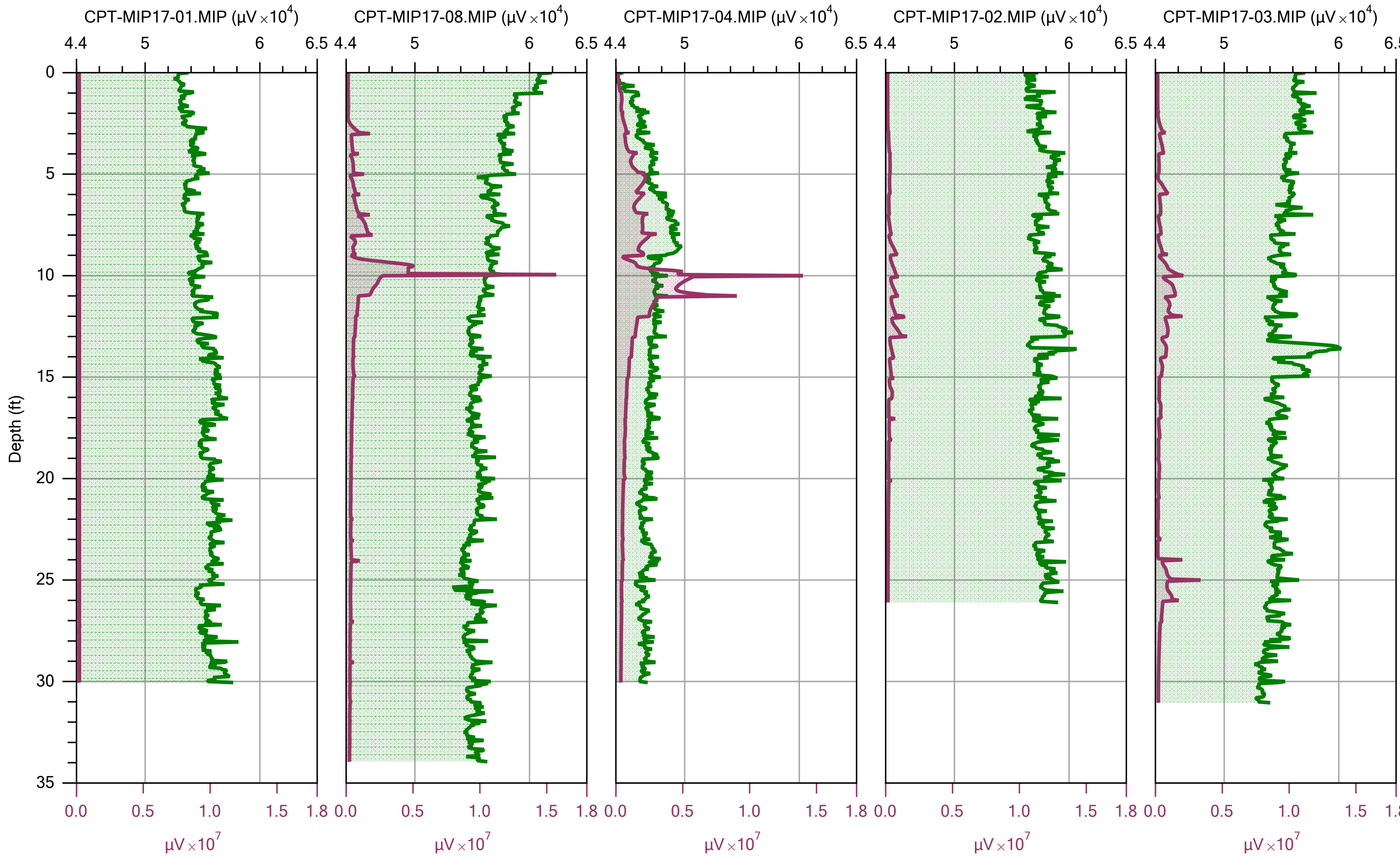
CPT-MIP17-01.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-08.MIP 9/20/2017
39° 50′ 14″ N, 79° 57′ 45″ W

CPT-MIP17-04.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-02.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-03.MIP 9/19/2017
39° 50′ 14″ N, 74° 57′ 44″ W



CPT-MIP17-01.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-08.MIP 9/20/2017
39° 50′ 14″ N, 79° 57′ 45″ W

CPT-MIP17-04.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-02.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-03.MIP 9/19/2017
39° 50′ 14″ N, 74° 57′ 44″ W

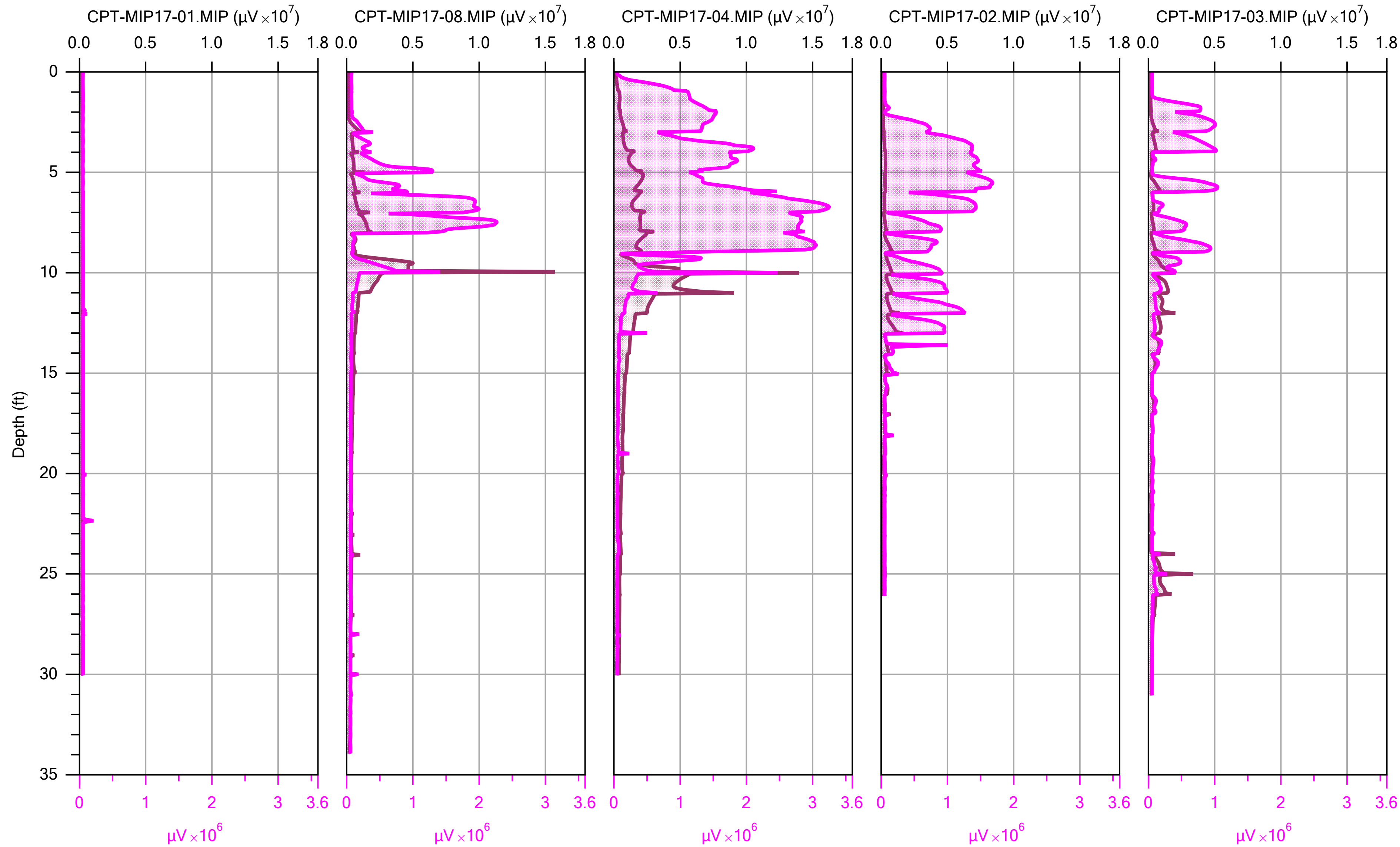
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

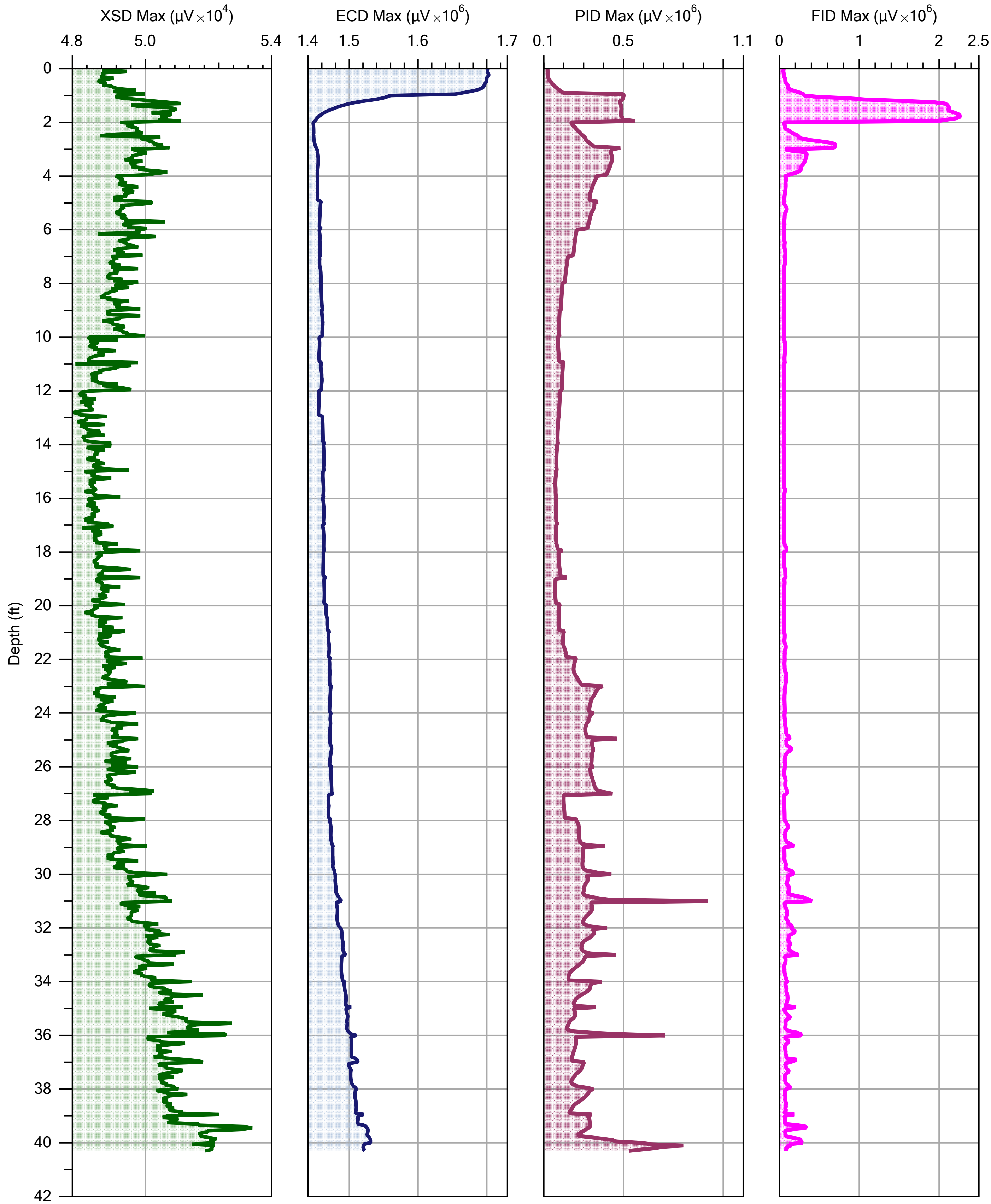
CPT-MIP17-01.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-08.MIP 9/20/2017
39° 50′ 14″ N, 79° 57′ 45″ W

CPT-MIP17-04.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 44″ W

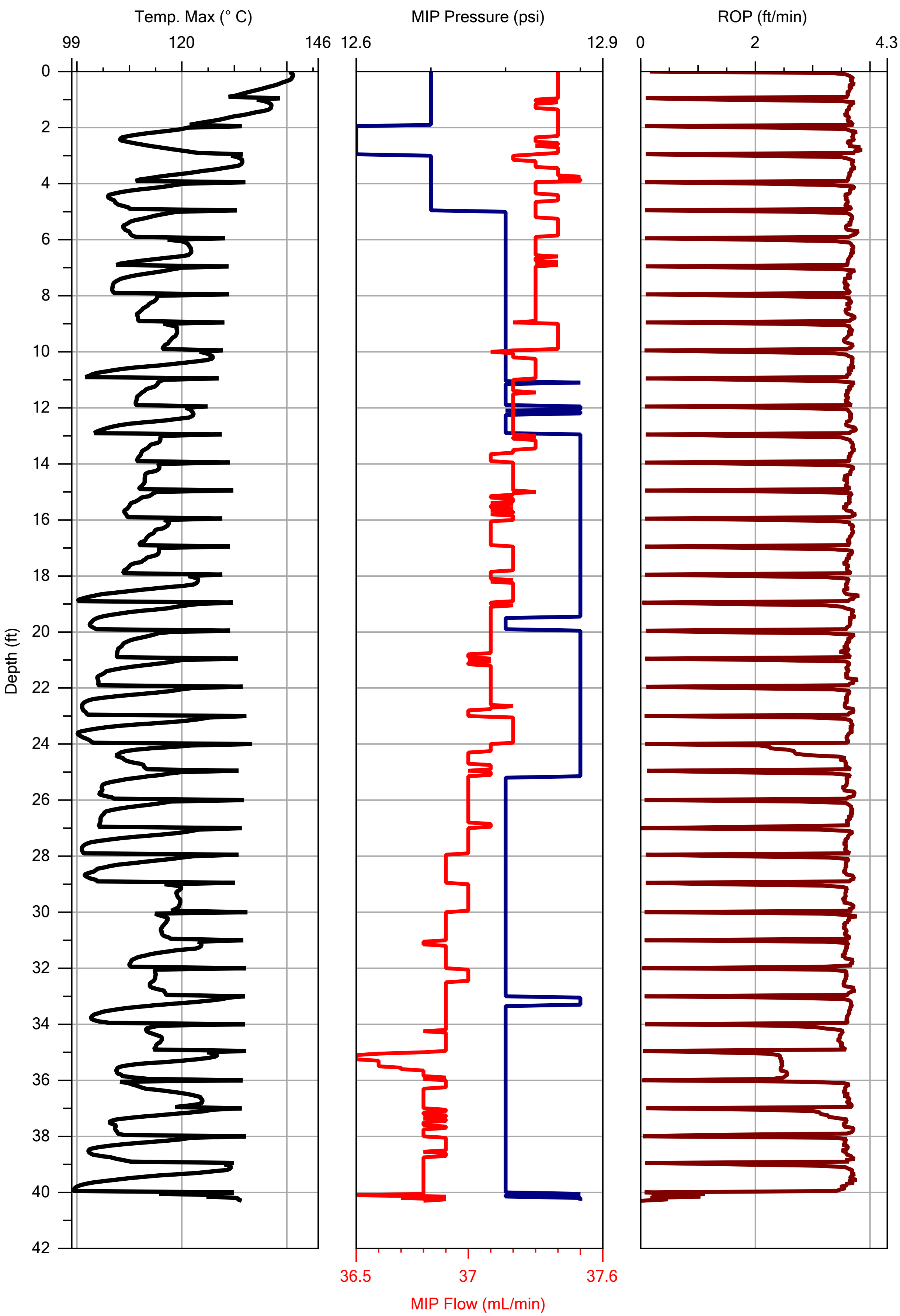
CPT-MIP17-02.MIP 9/19/2017
39° 50′ 15″ N, 74° 57′ 44″ W

CPT-MIP17-03.MIP 9/19/2017
39° 50′ 14″ N, 74° 57′ 44″ W



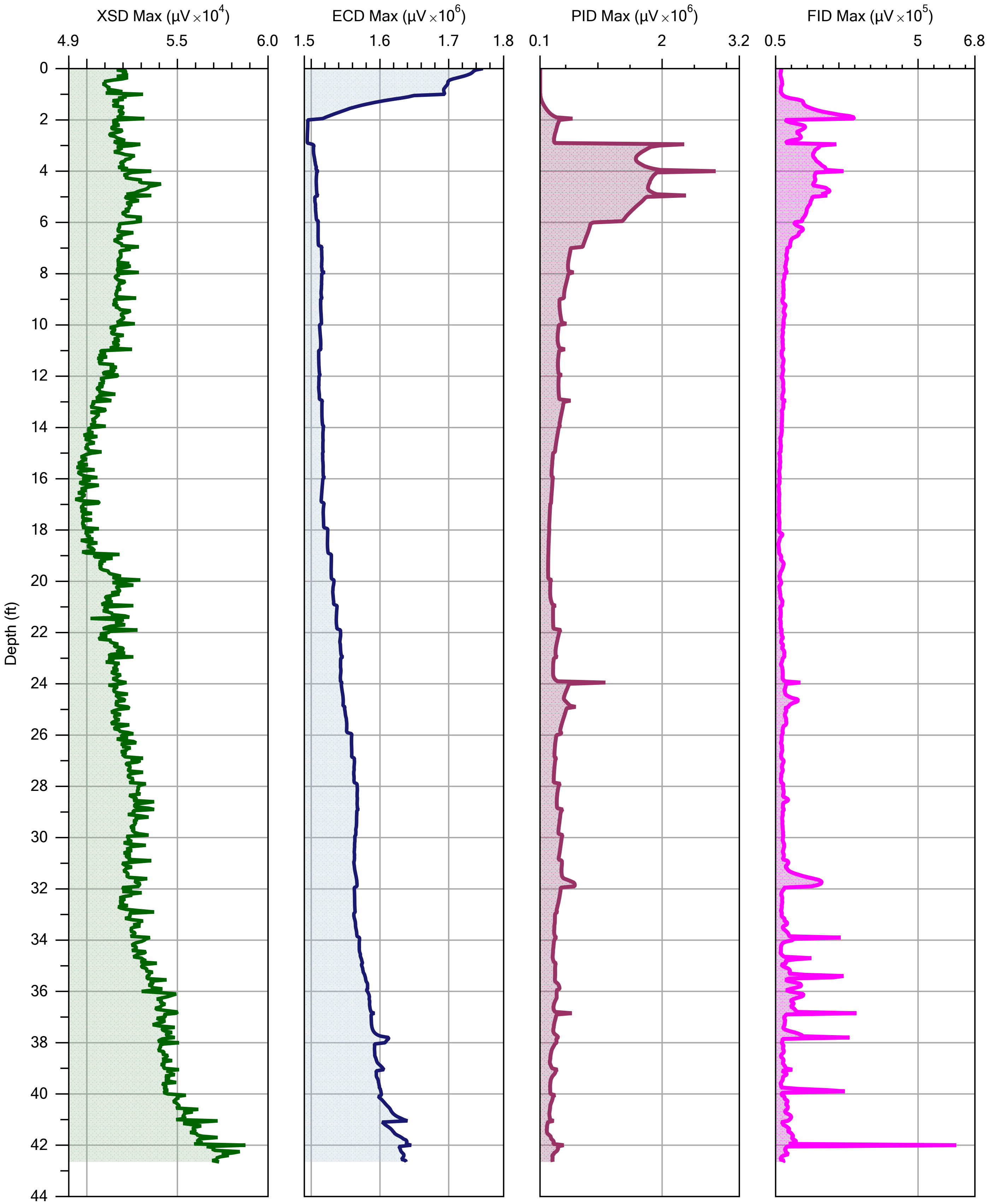
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-19.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



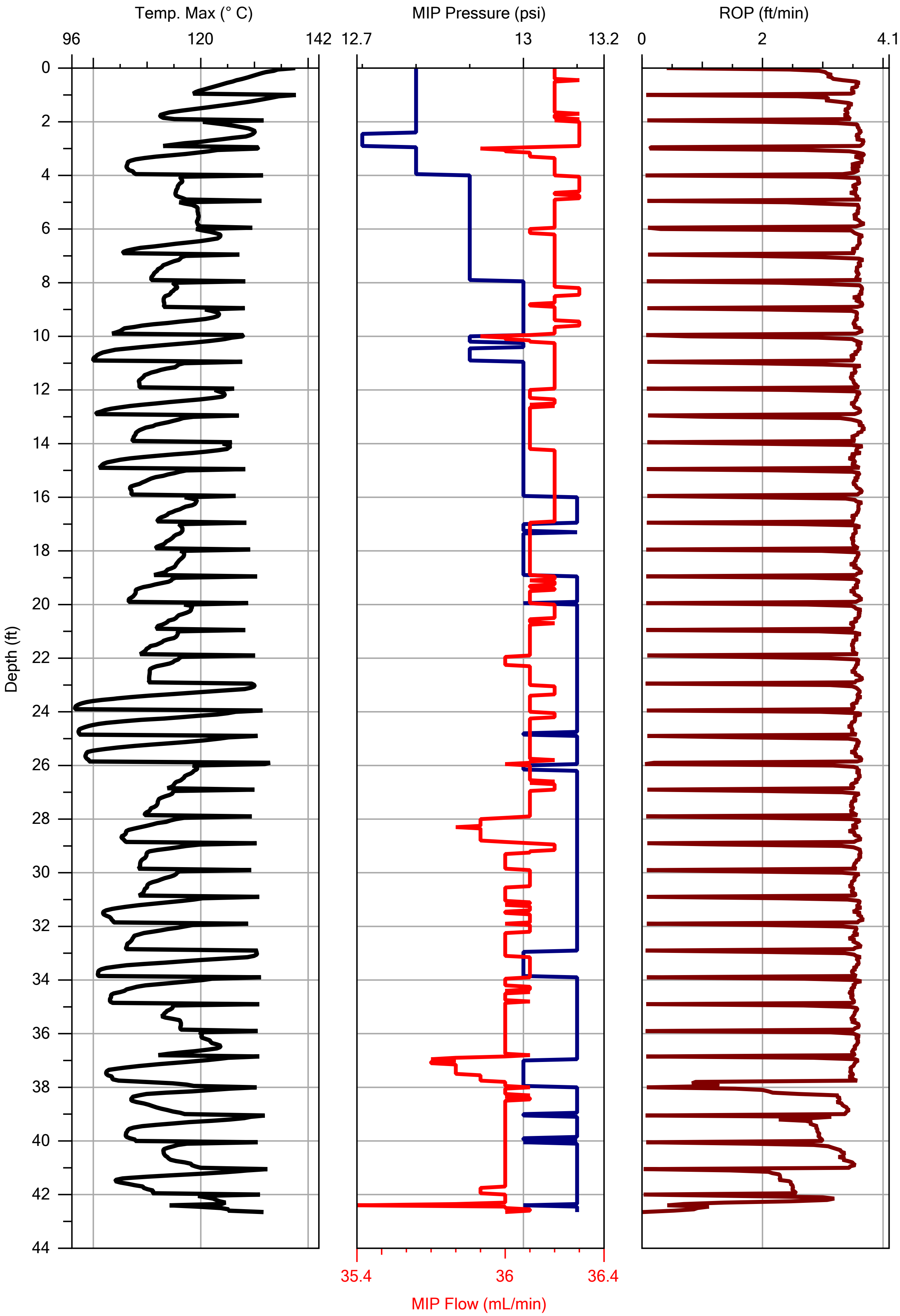
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-19.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



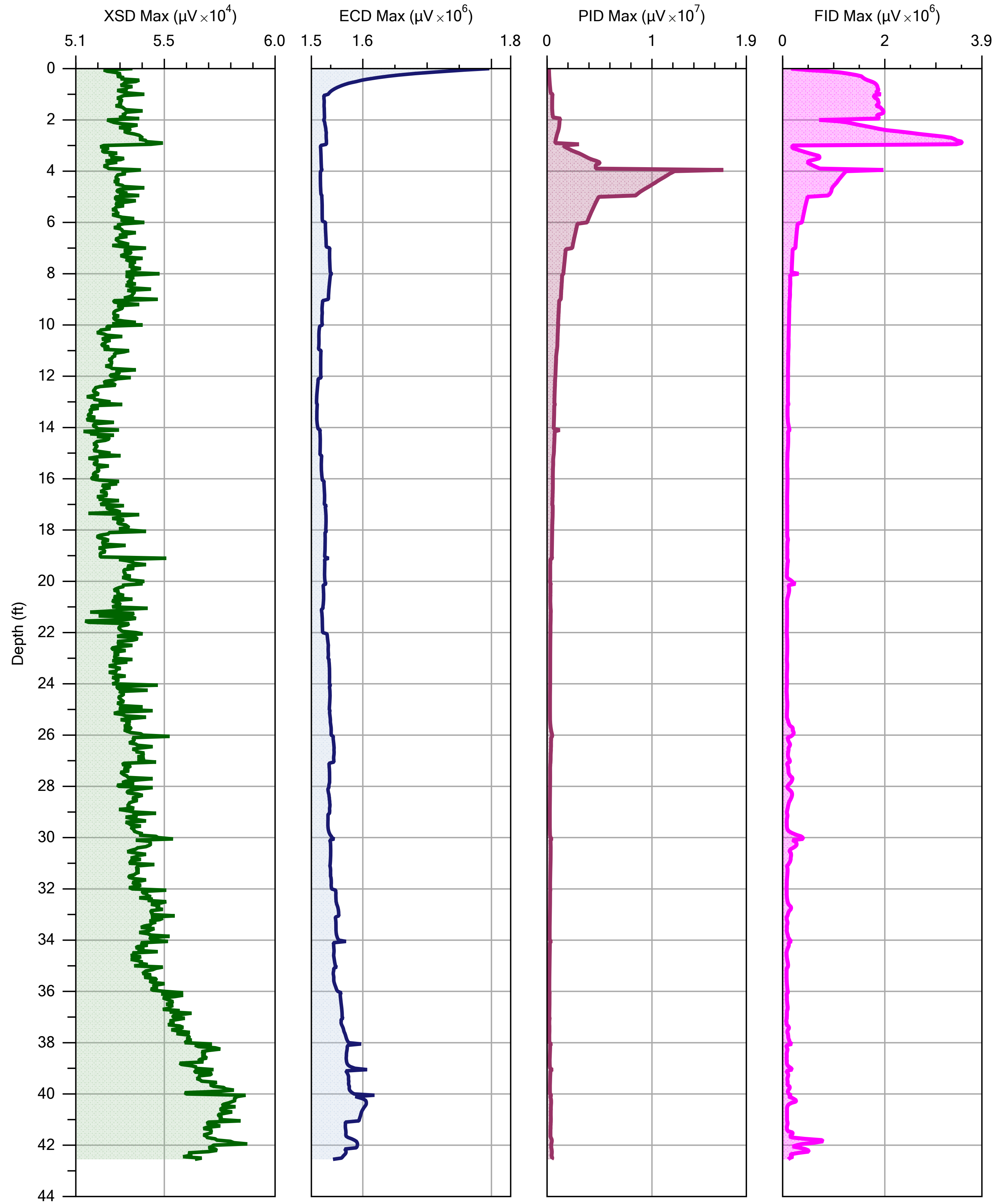
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-20.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 50″ W



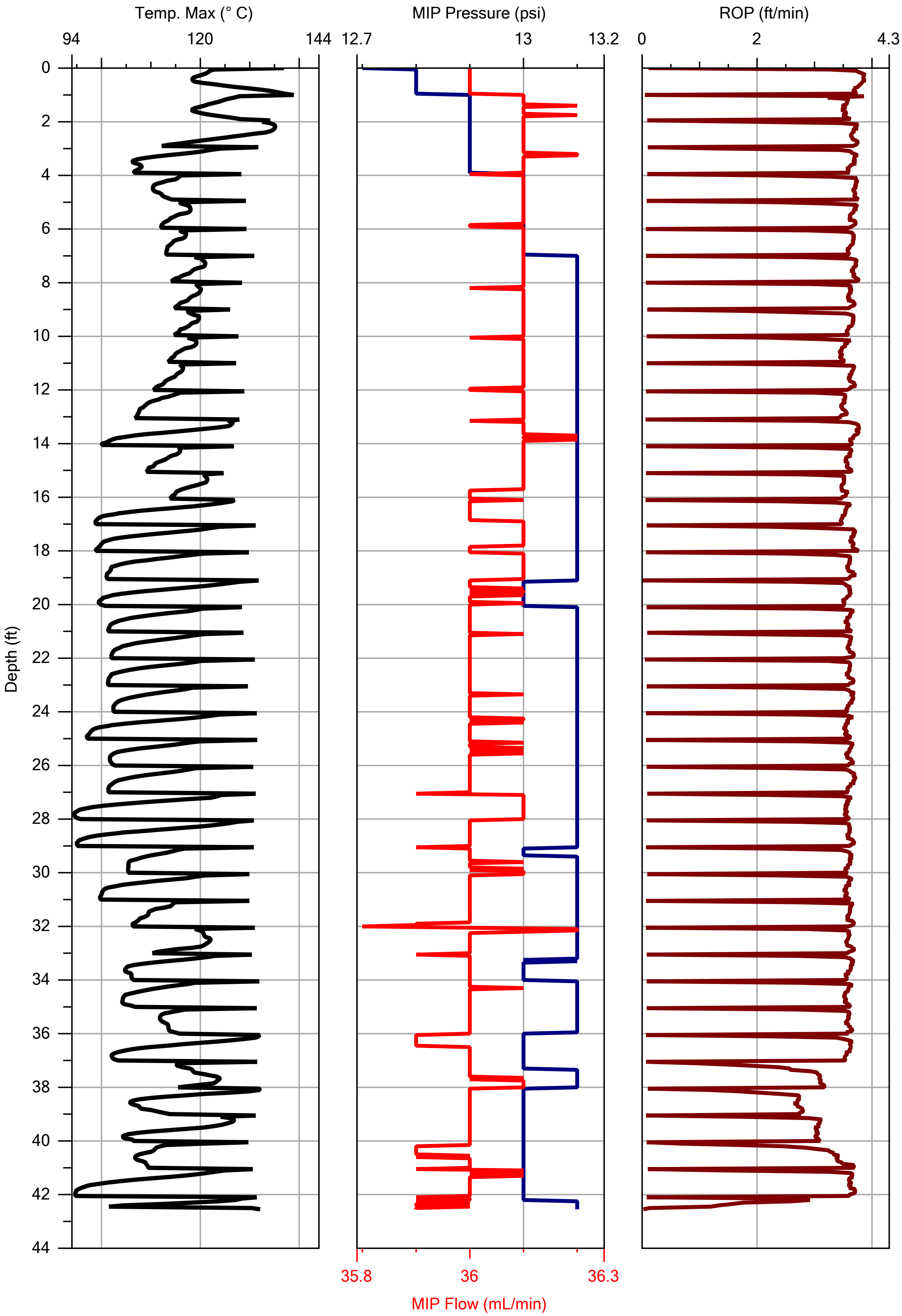
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-20.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 50″ W



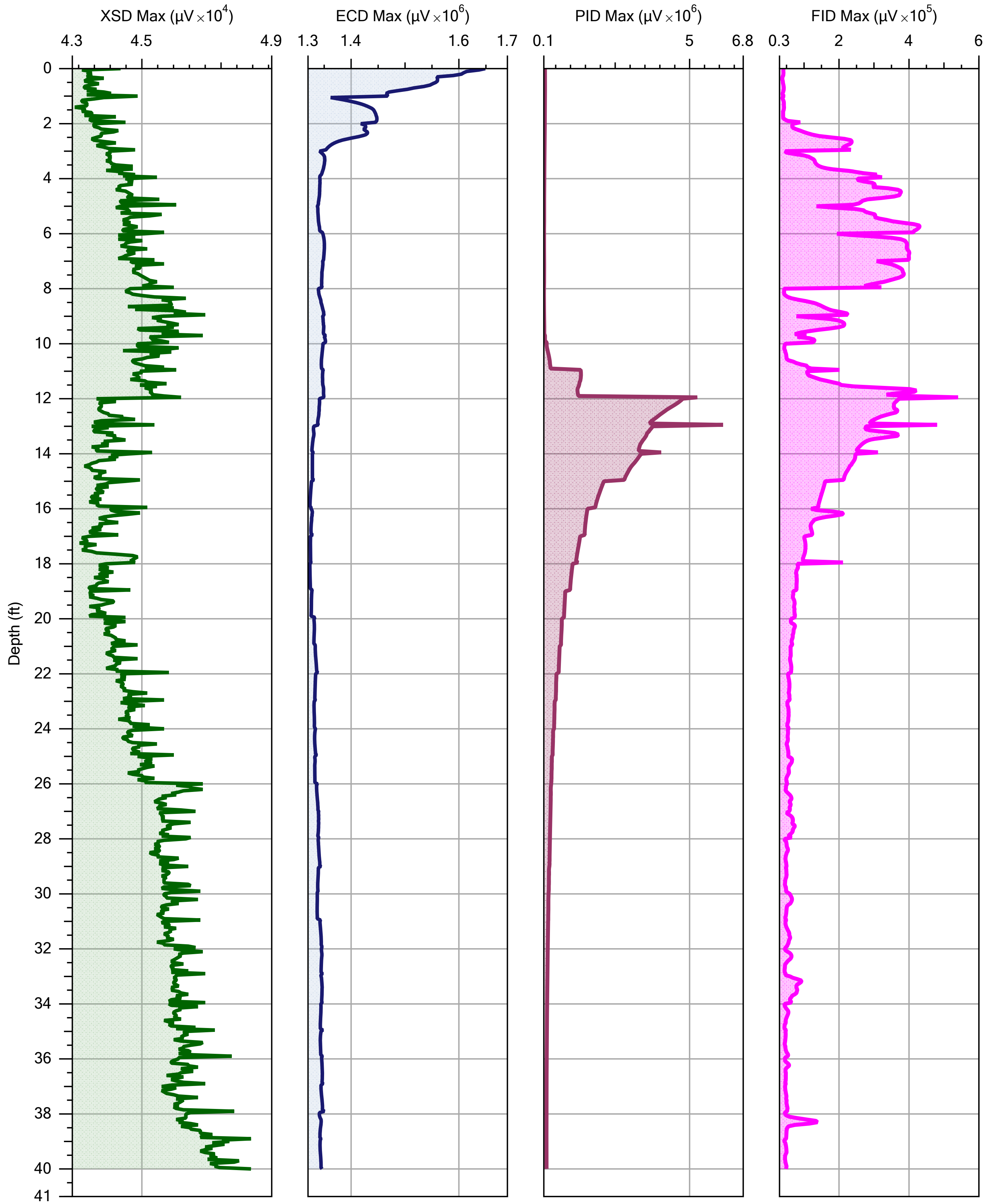
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-21.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



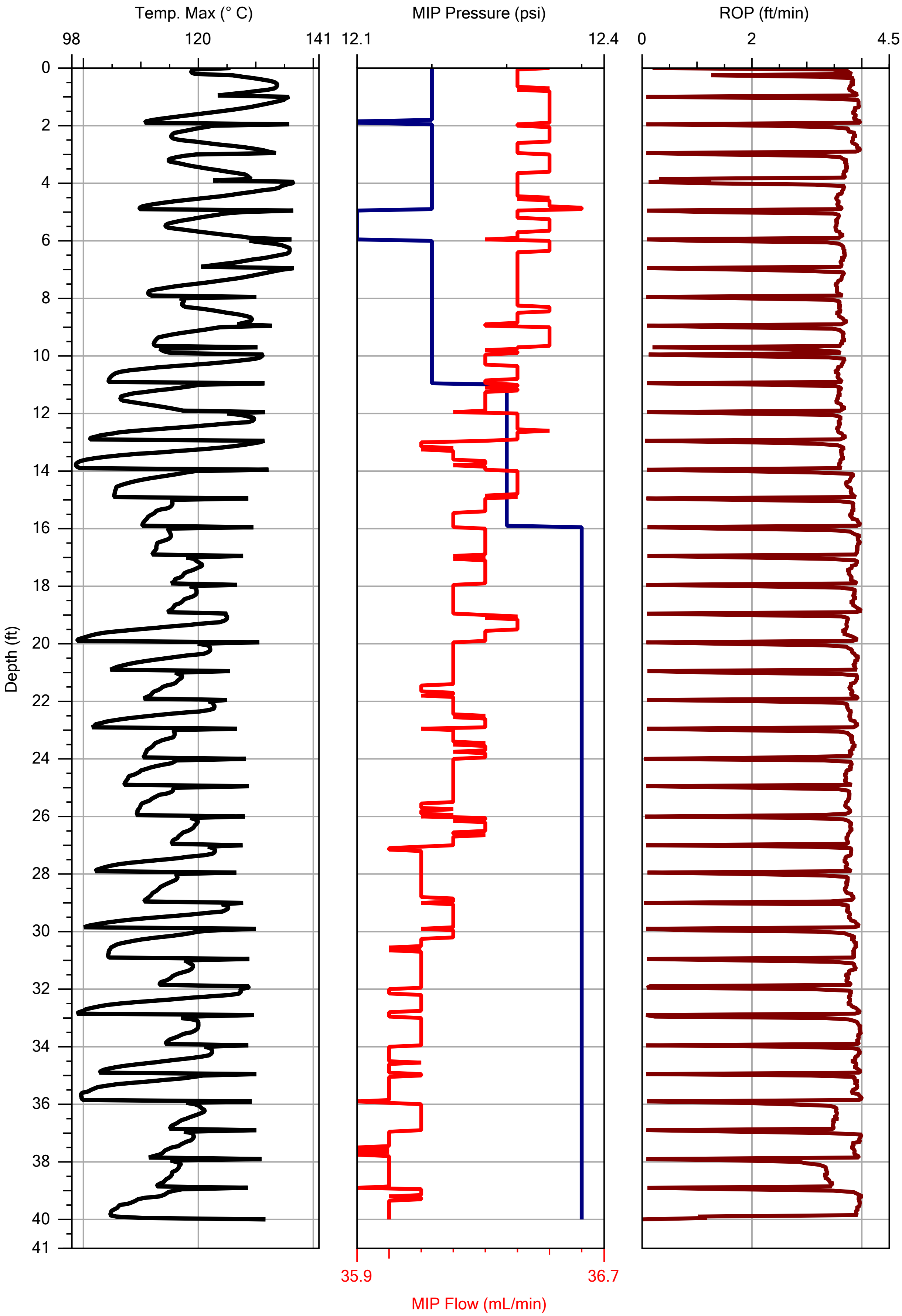
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-21.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/25/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



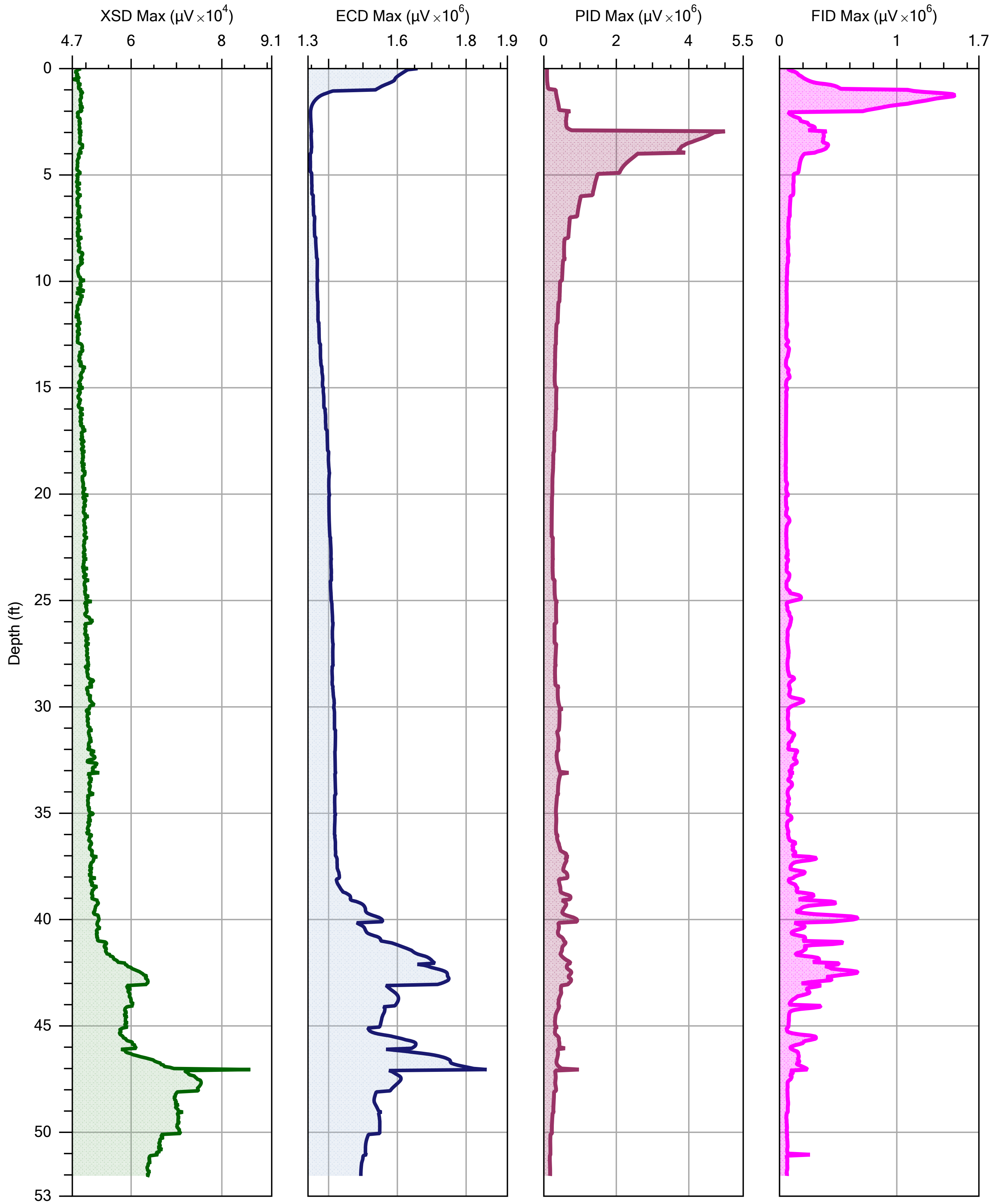
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-22.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 47″ W



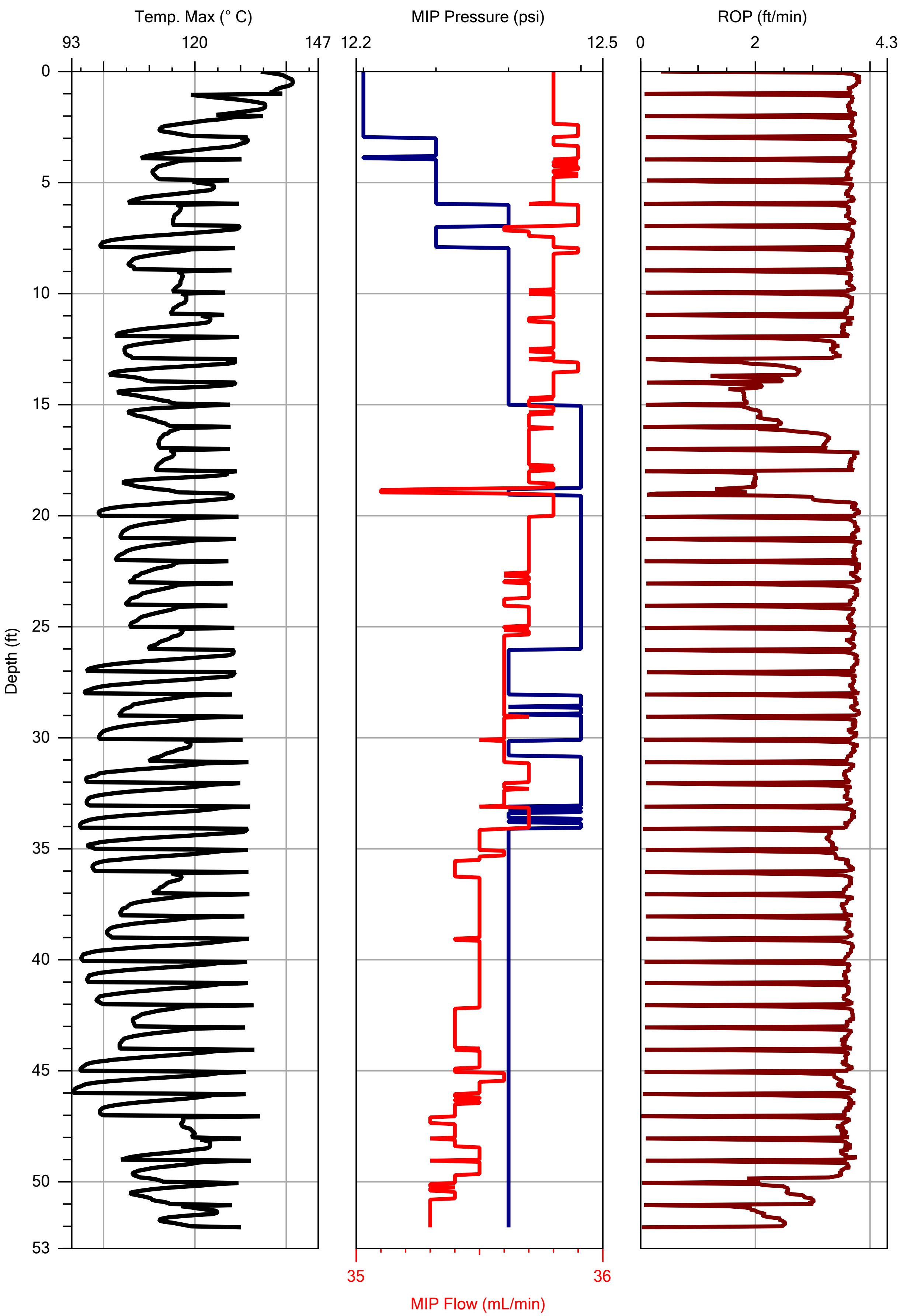
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-22.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 47″ W



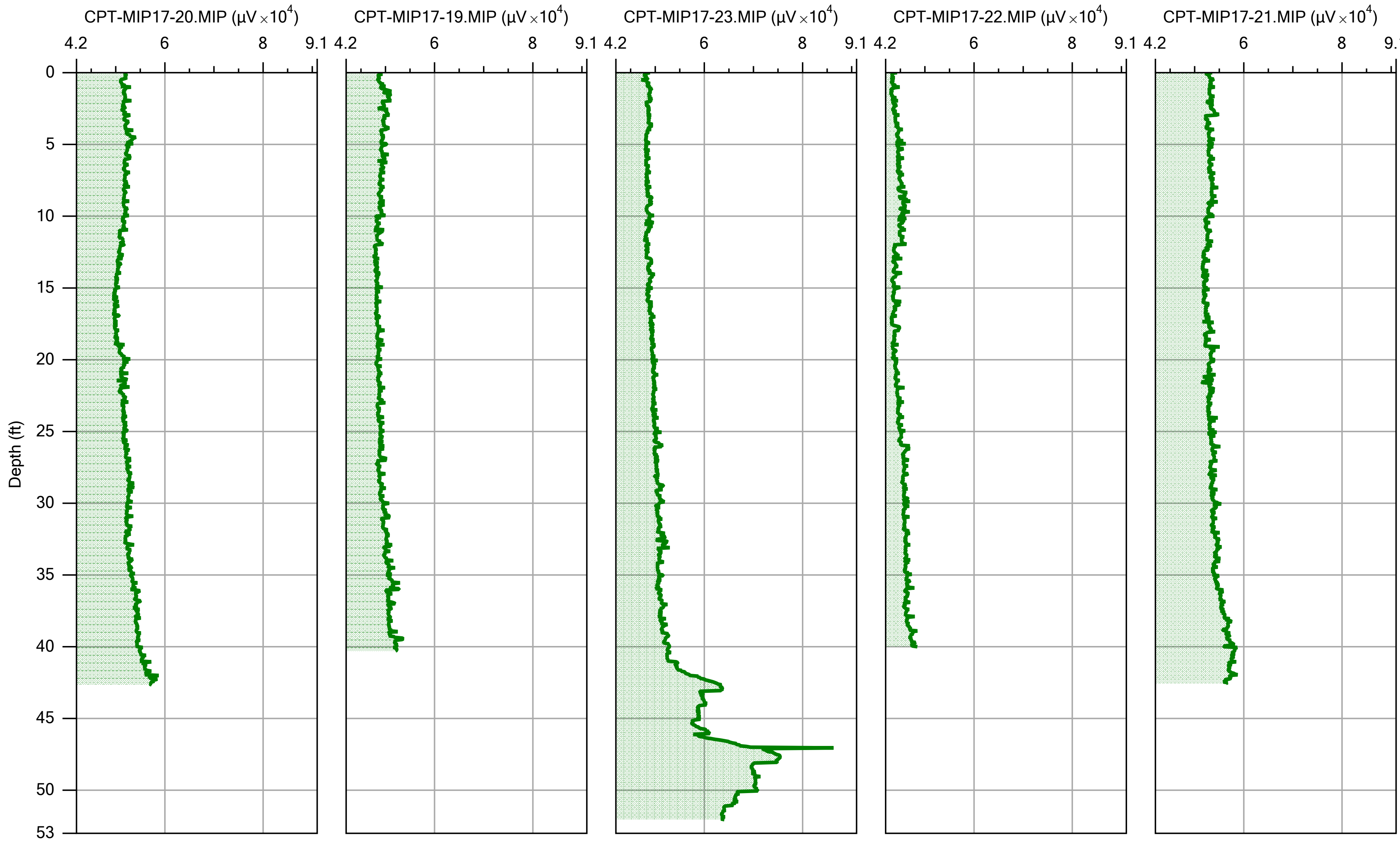
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-23.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 49″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-23.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 49″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

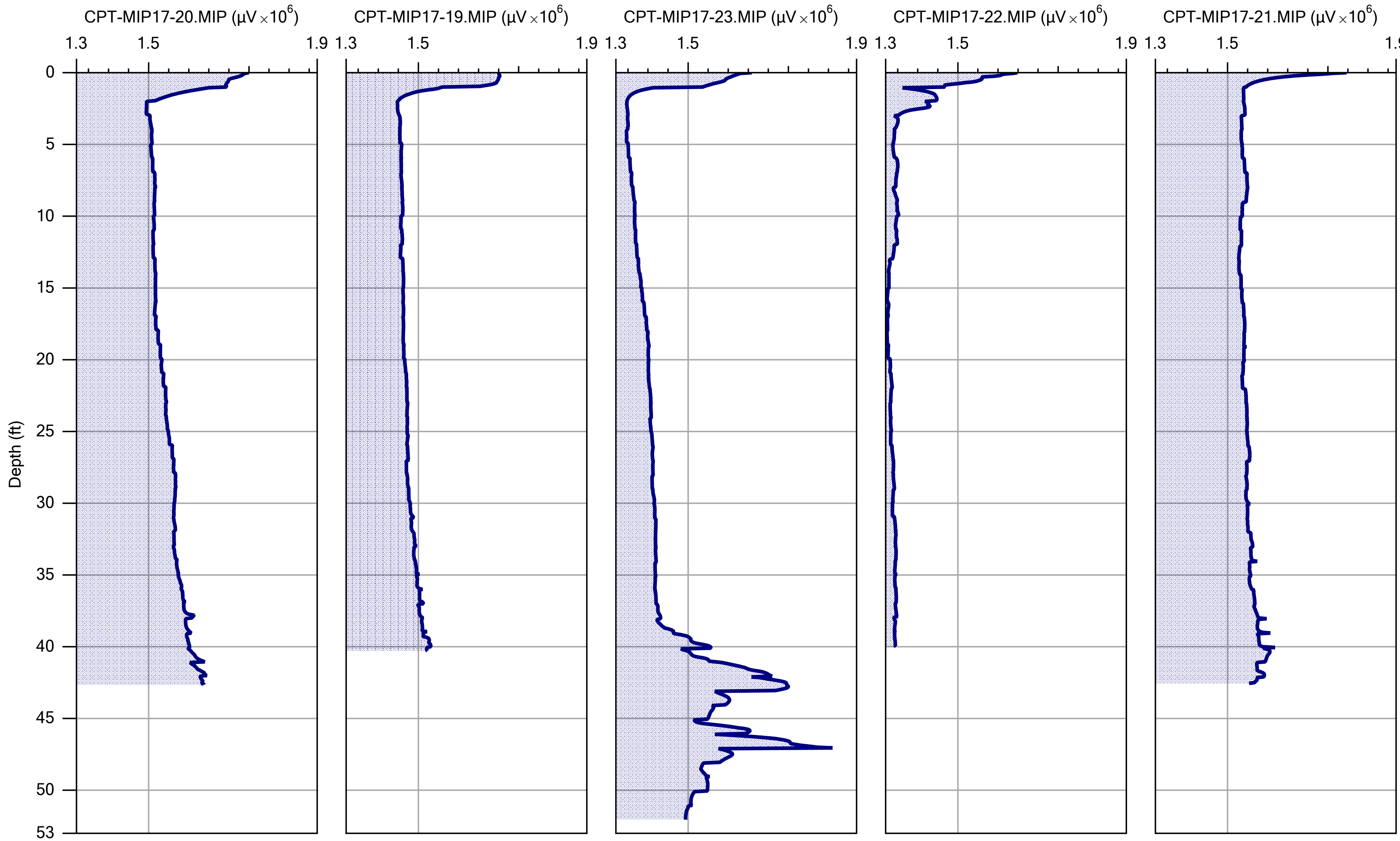
CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W

CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W

CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W



CPT-MIP17-20.MIP 9/25/2017	39° 50′ 10″ N, 74° 57′ 50″ W
CPT-MIP17-19.MIP 9/25/2017	39° 50′ 9″ N, 74° 57′ 50″ W
CPT-MIP17-23.MIP 9/26/2017	39° 50′ 9″ N, 74° 57′ 49″ W
CPT-MIP17-22.MIP 9/26/2017	39° 50′ 9″ N, 74° 57′ 47″ W
CPT-MIP17-21.MIP 9/25/2017	39° 50′ 9″ N, 74° 57′ 50″ W

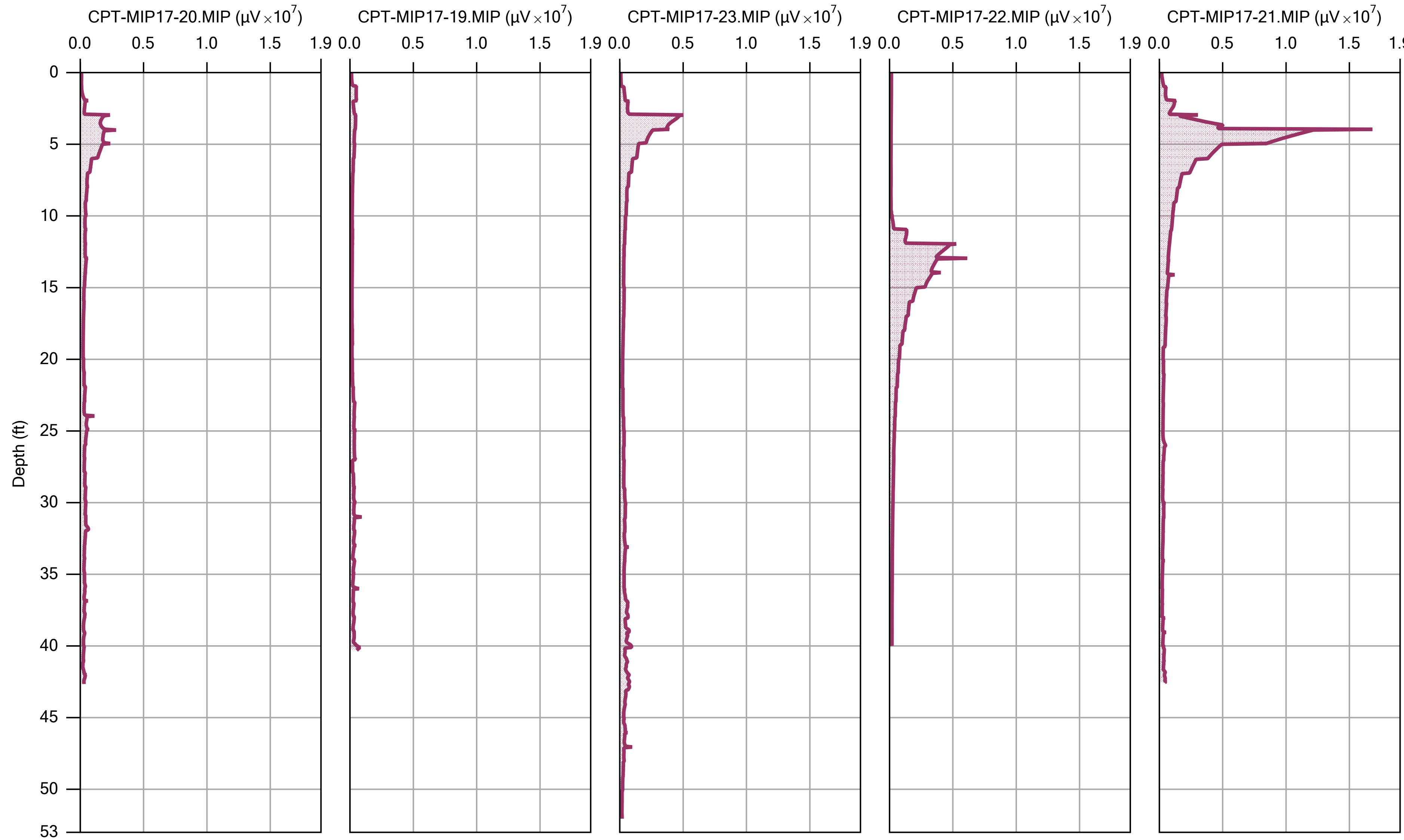
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W

CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W

CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

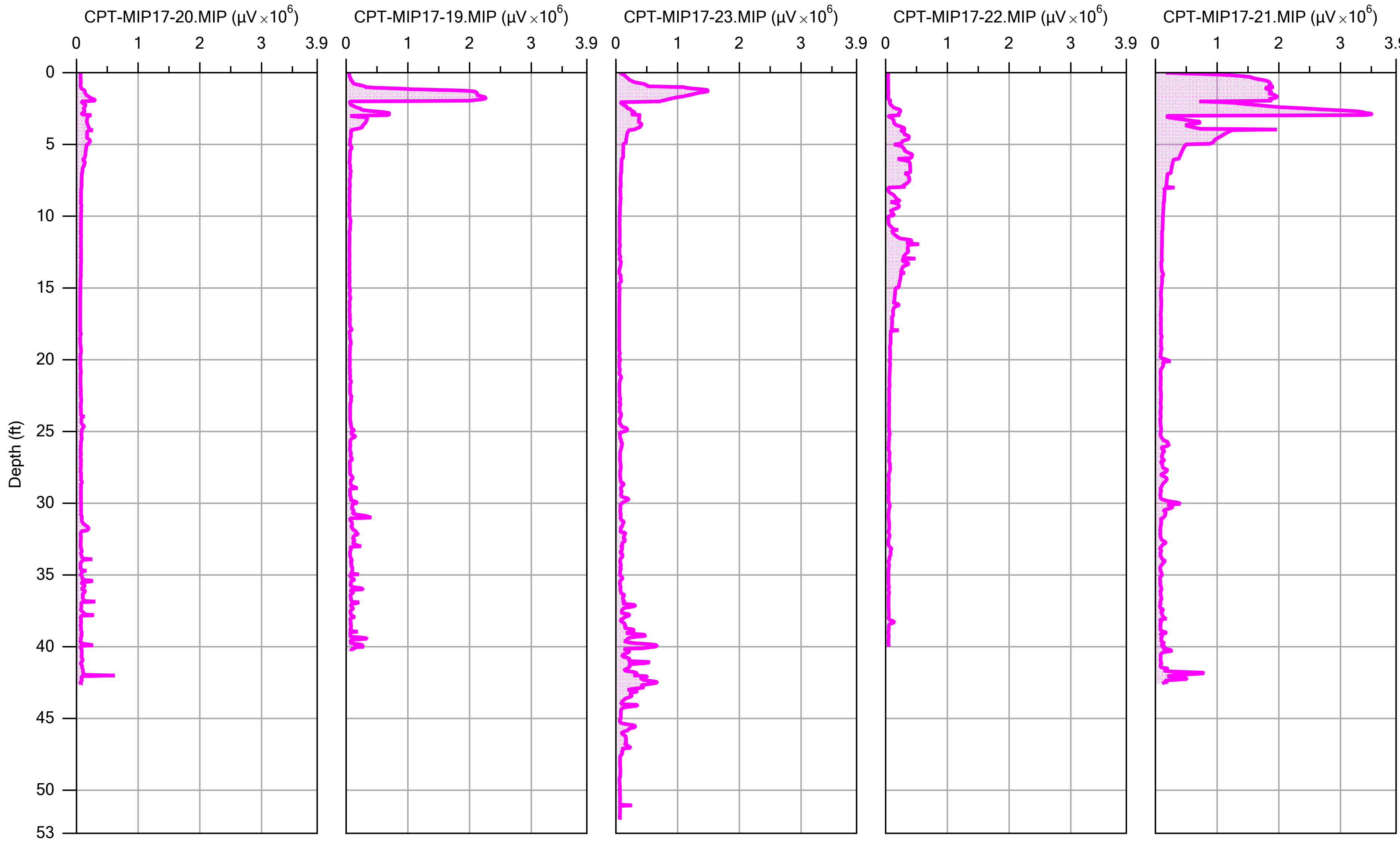
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W
CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W
CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W
CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W
CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

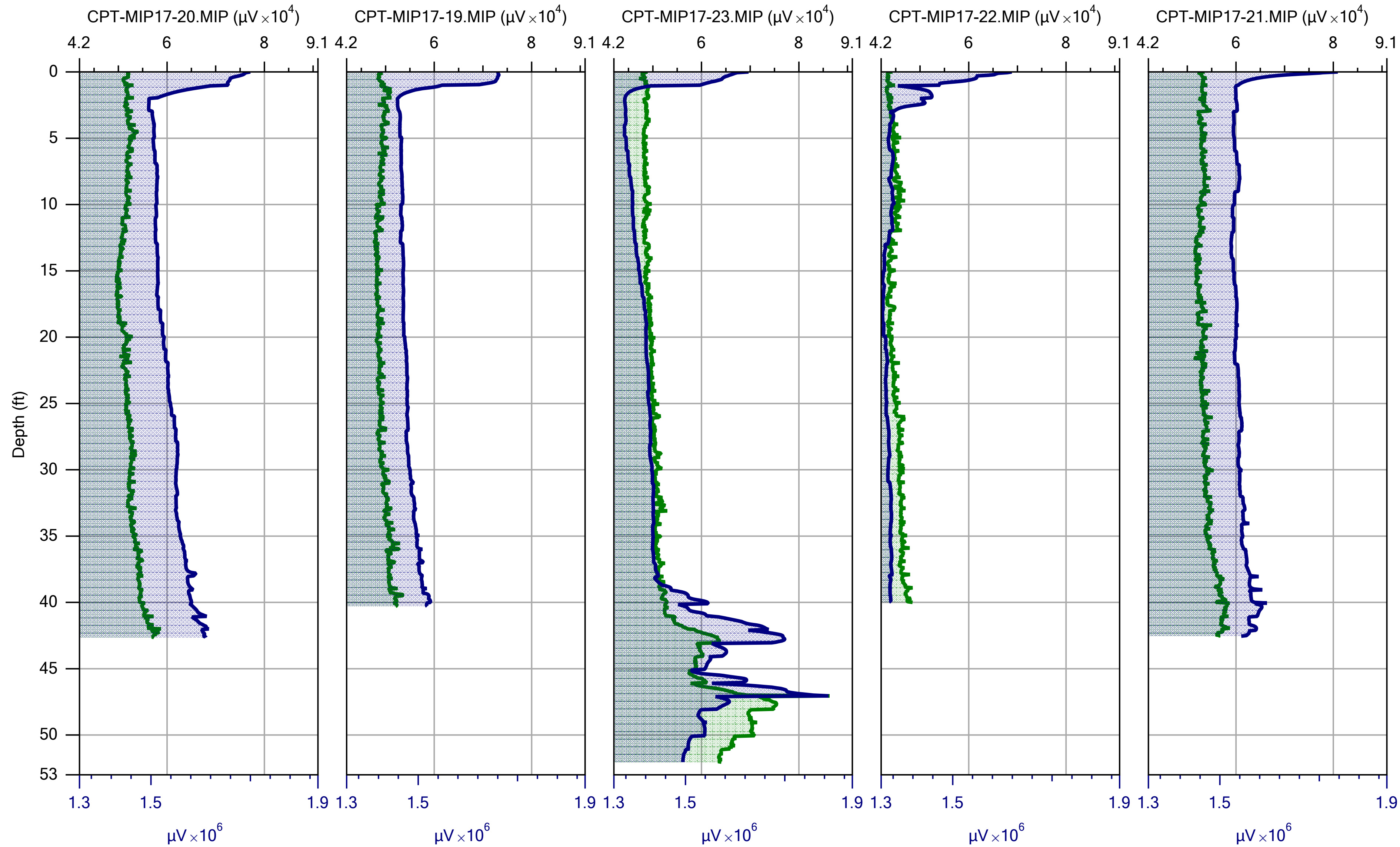
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W

CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W

CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

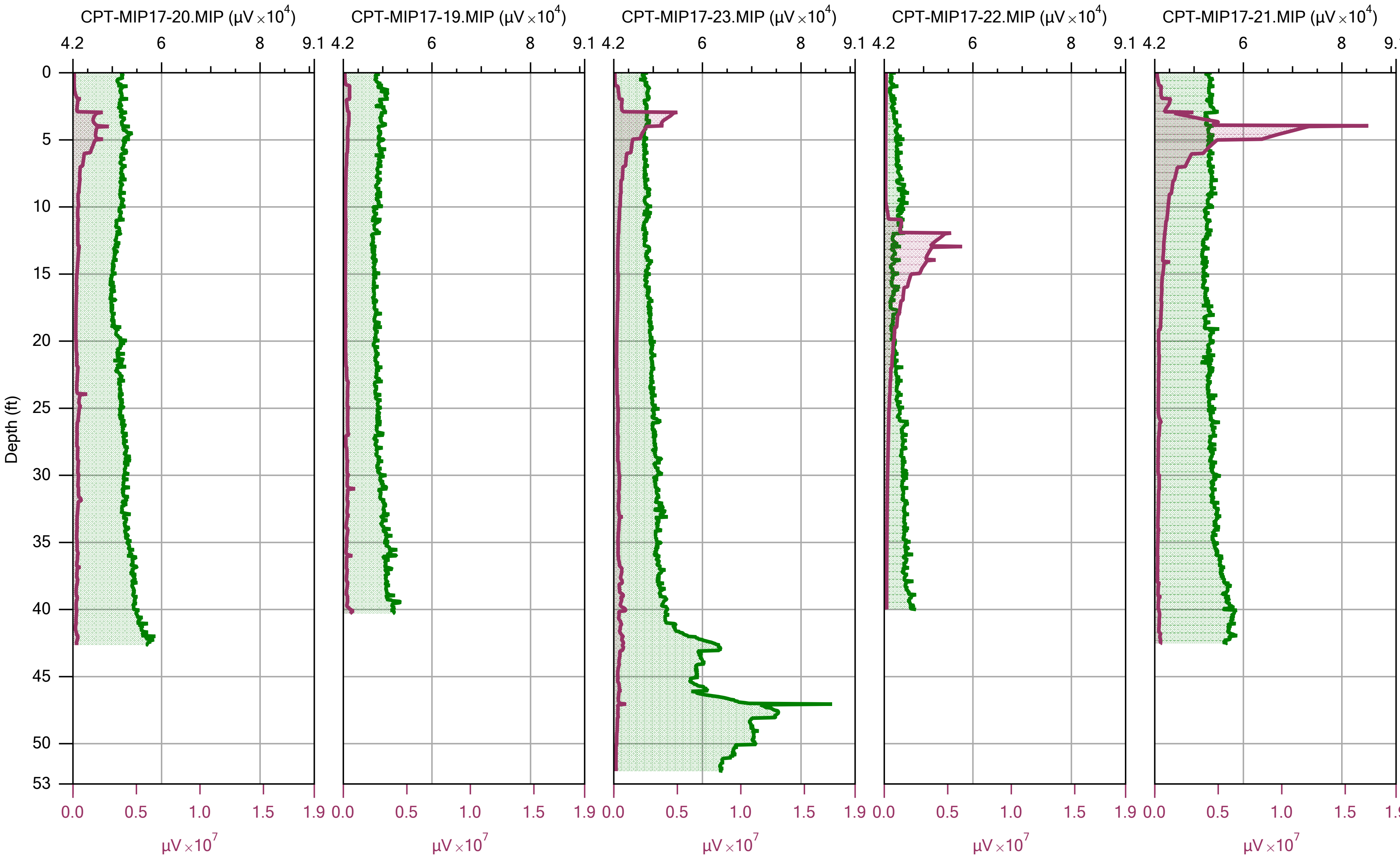
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W

CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W

CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

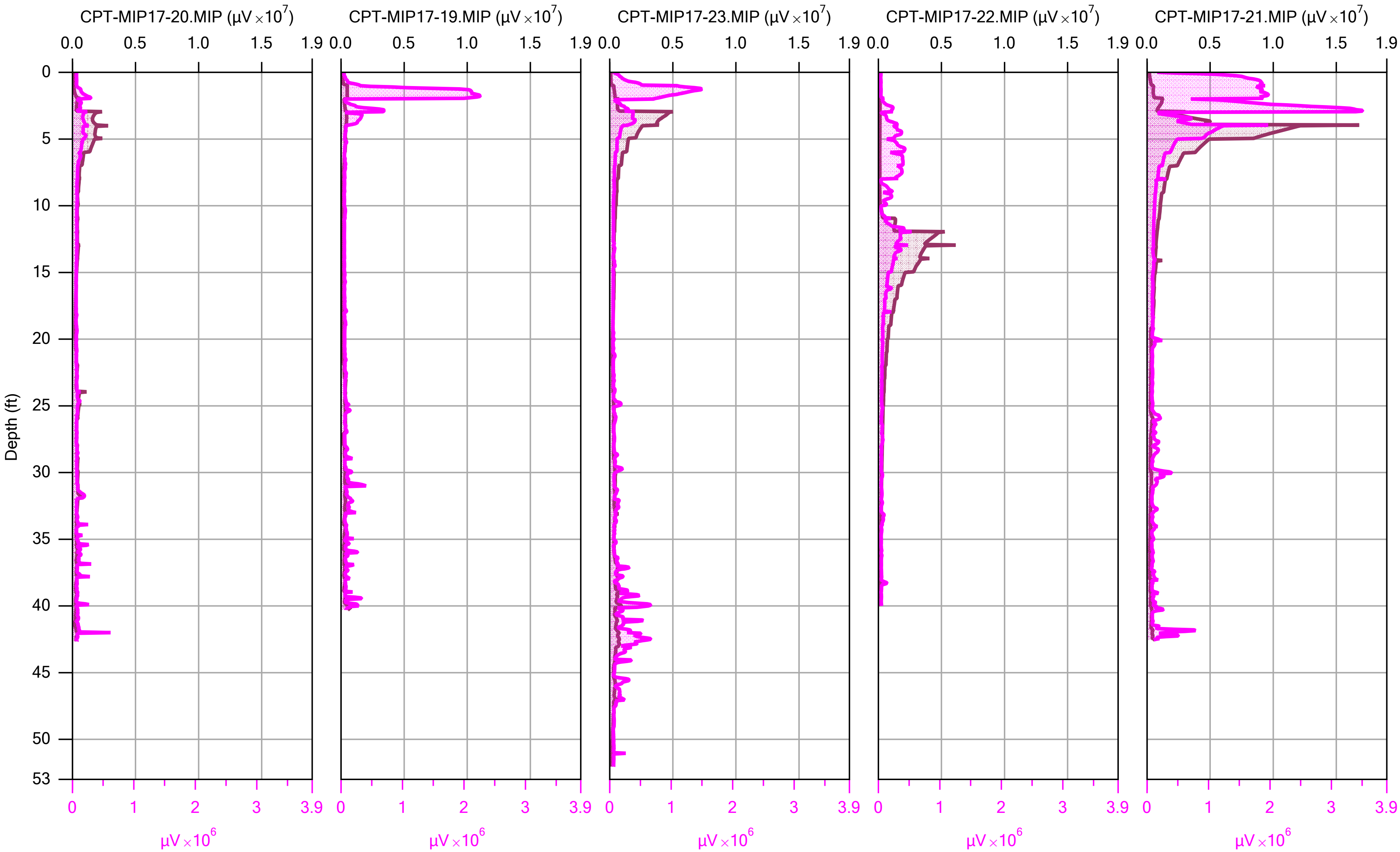
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

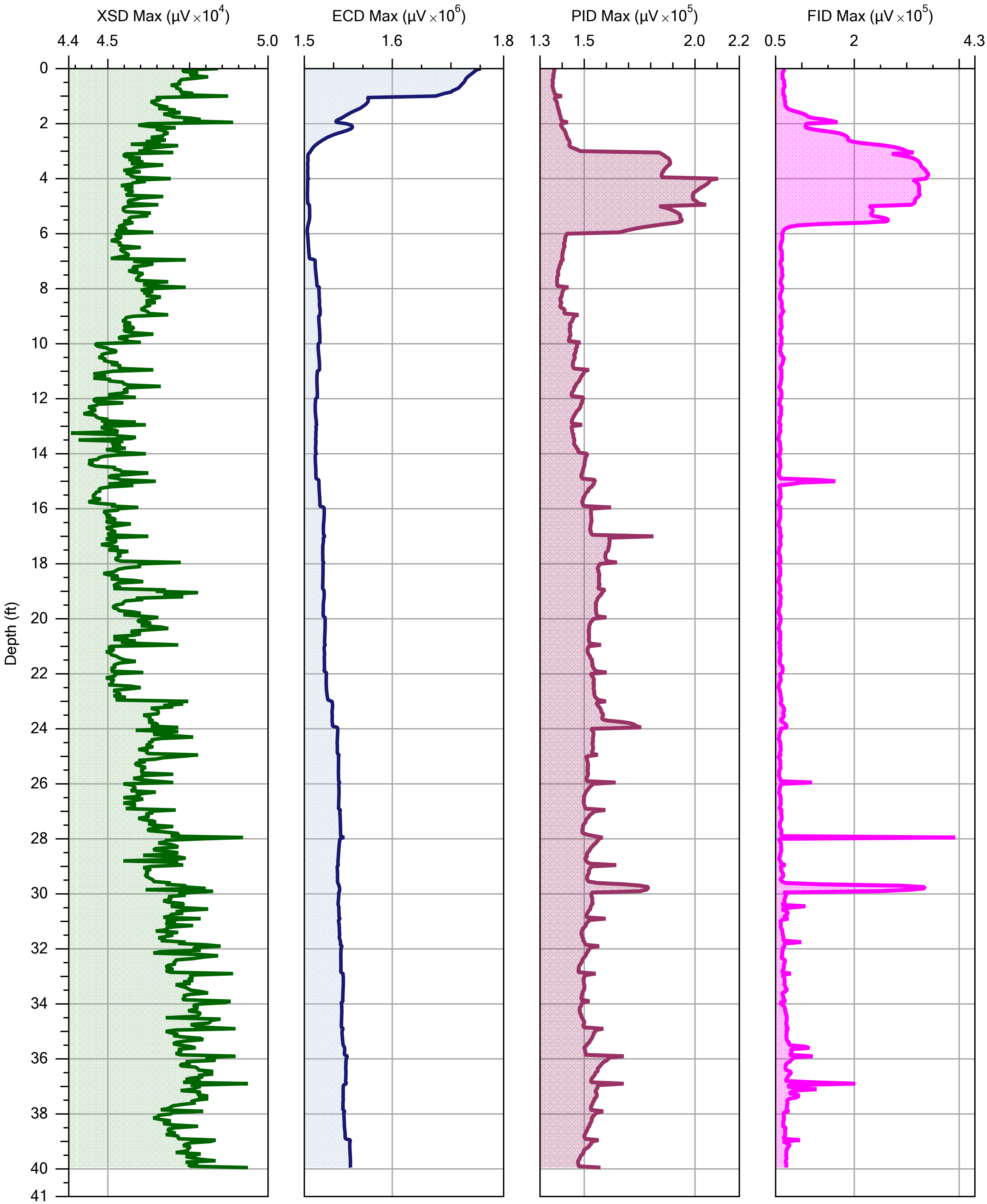
CPT-MIP17-20.MIP 9/25/2017
39° 50′ 10″ N, 74° 57′ 50″ W

CPT-MIP17-19.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-23.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 49″ W

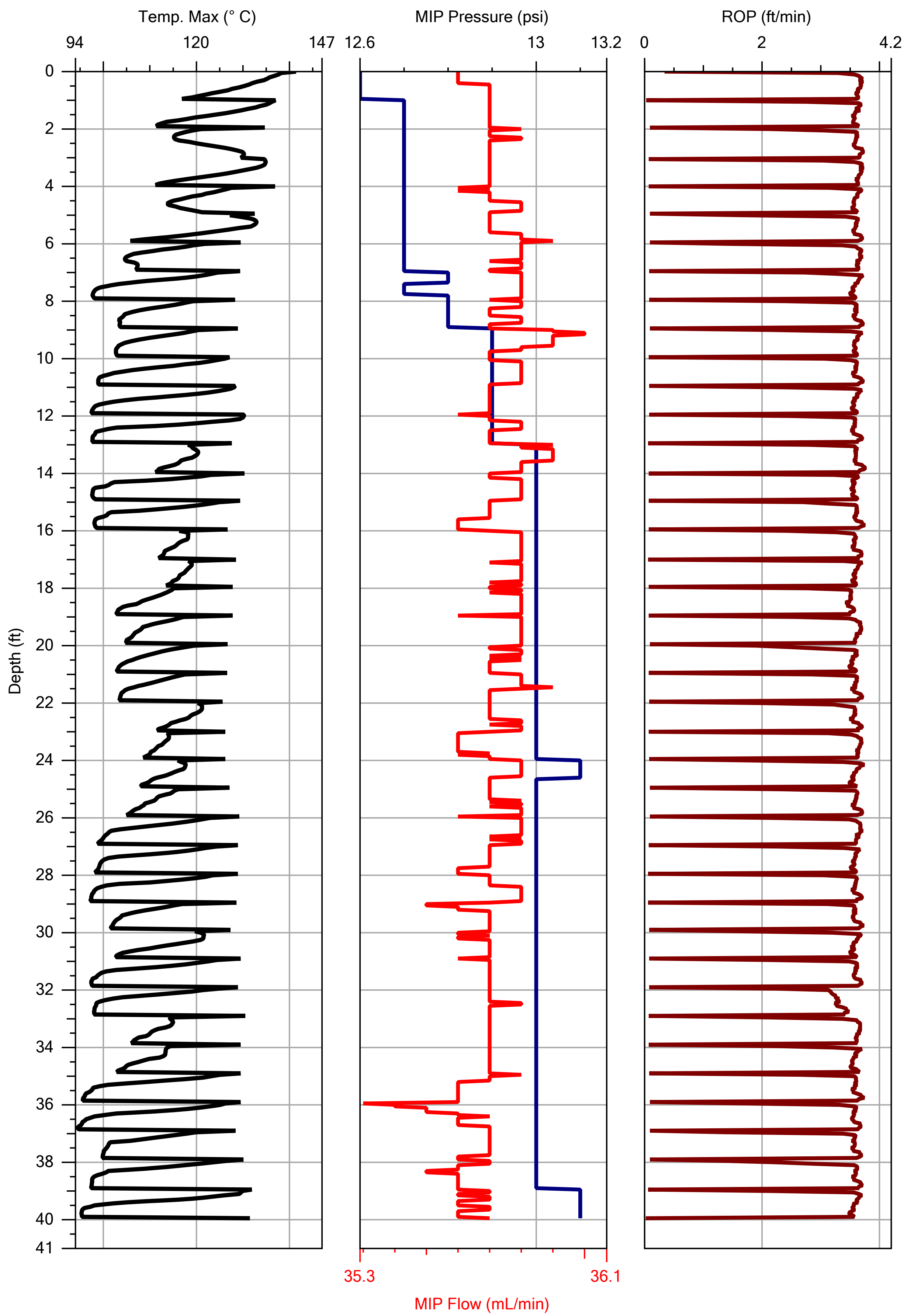
CPT-MIP17-22.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-21.MIP 9/25/2017
39° 50′ 9″ N, 74° 57′ 50″ W



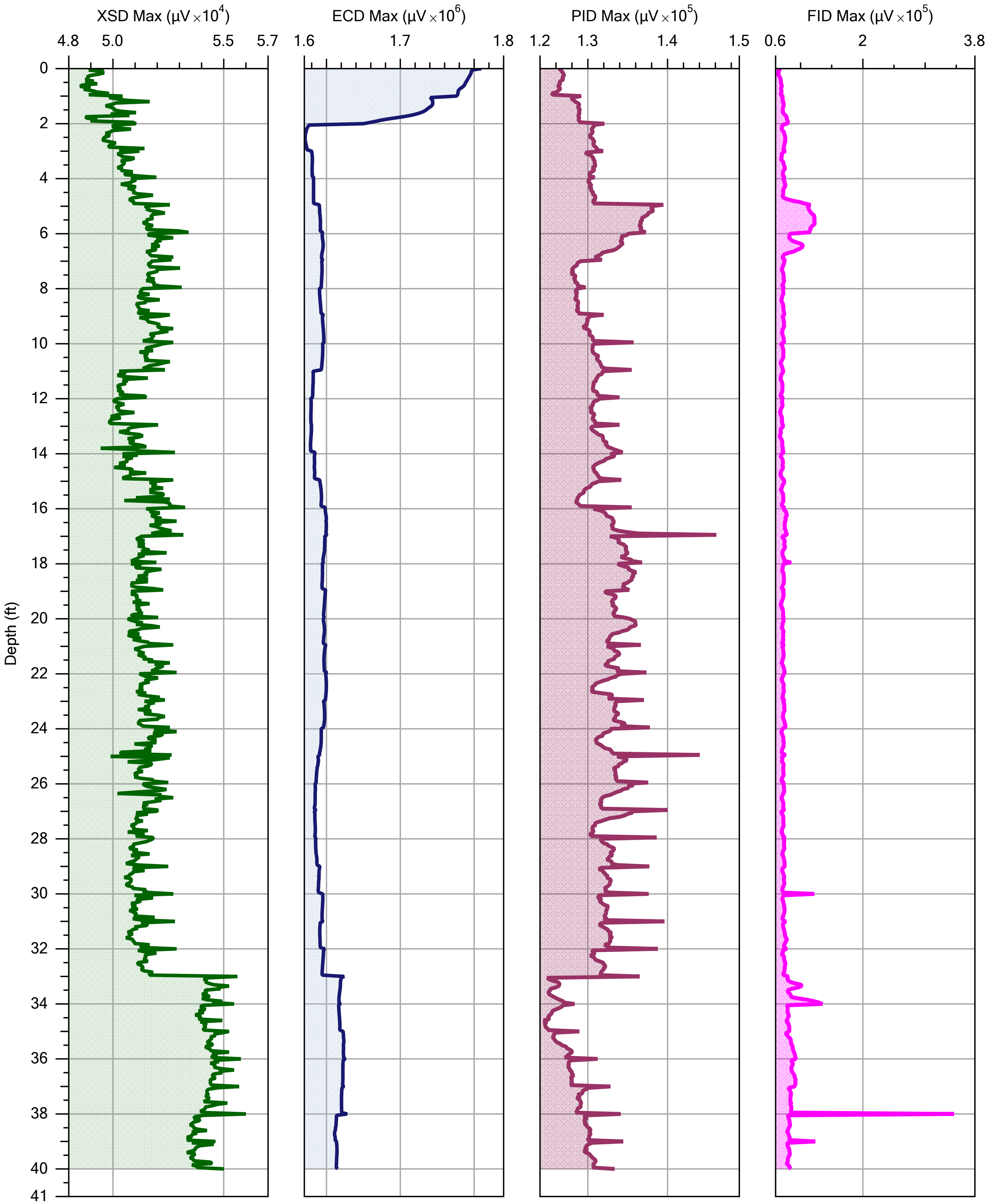
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-12.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 7″ N, 74° 57′ 51″ W



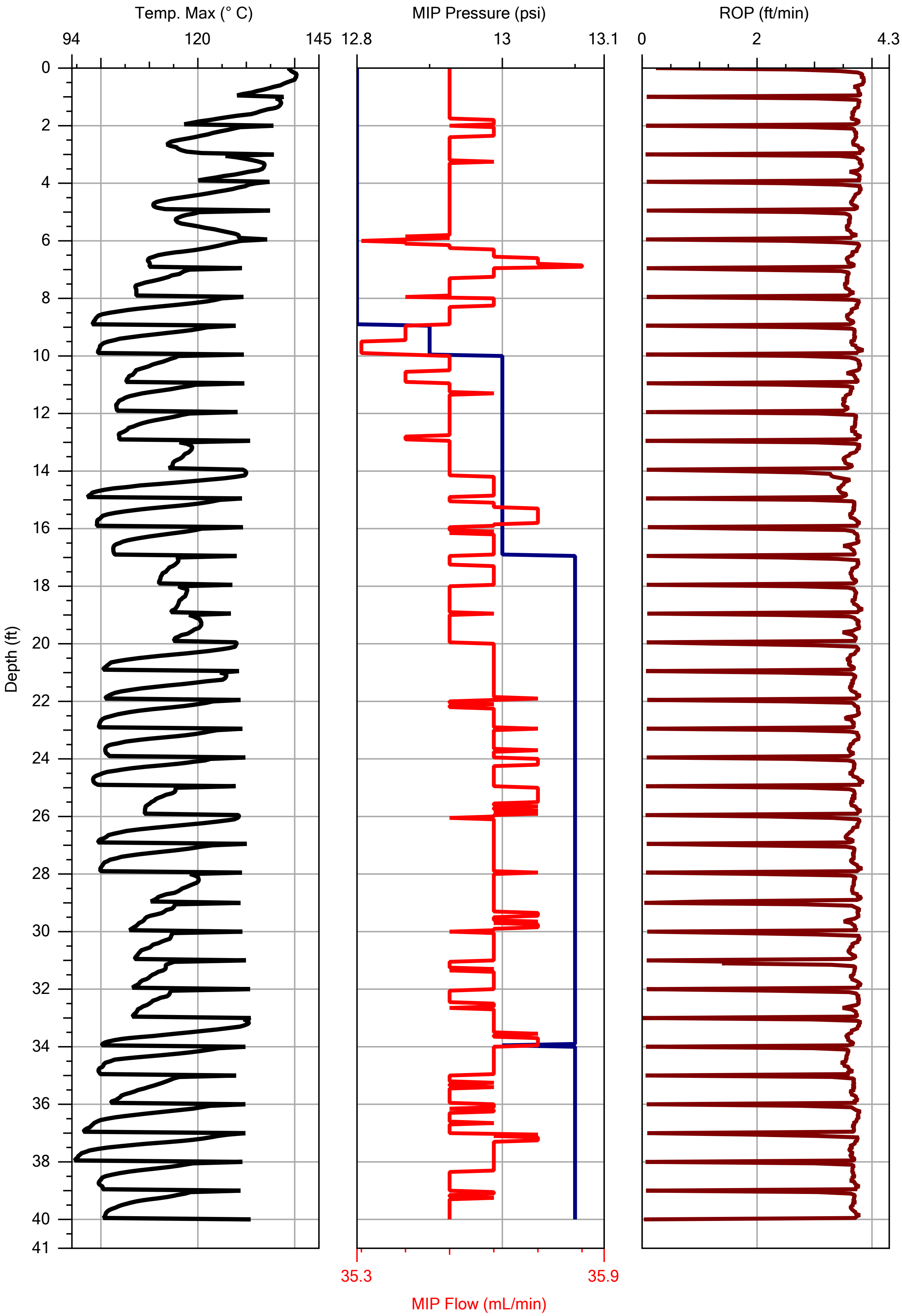
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-12.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 7″ N, 74° 57′ 51″ W



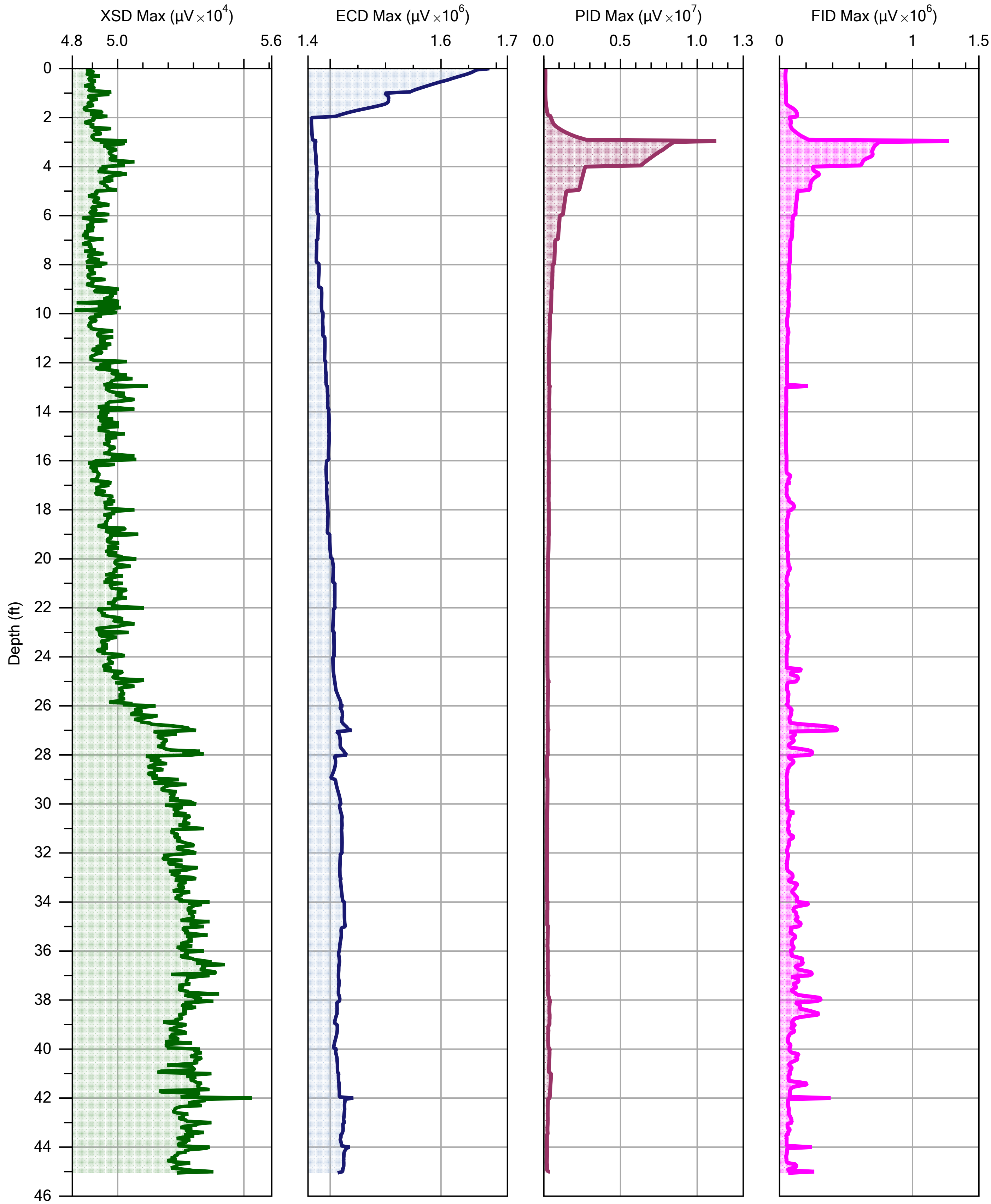
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-13.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 51′ 15″ N, 74° 57′ 52″ W



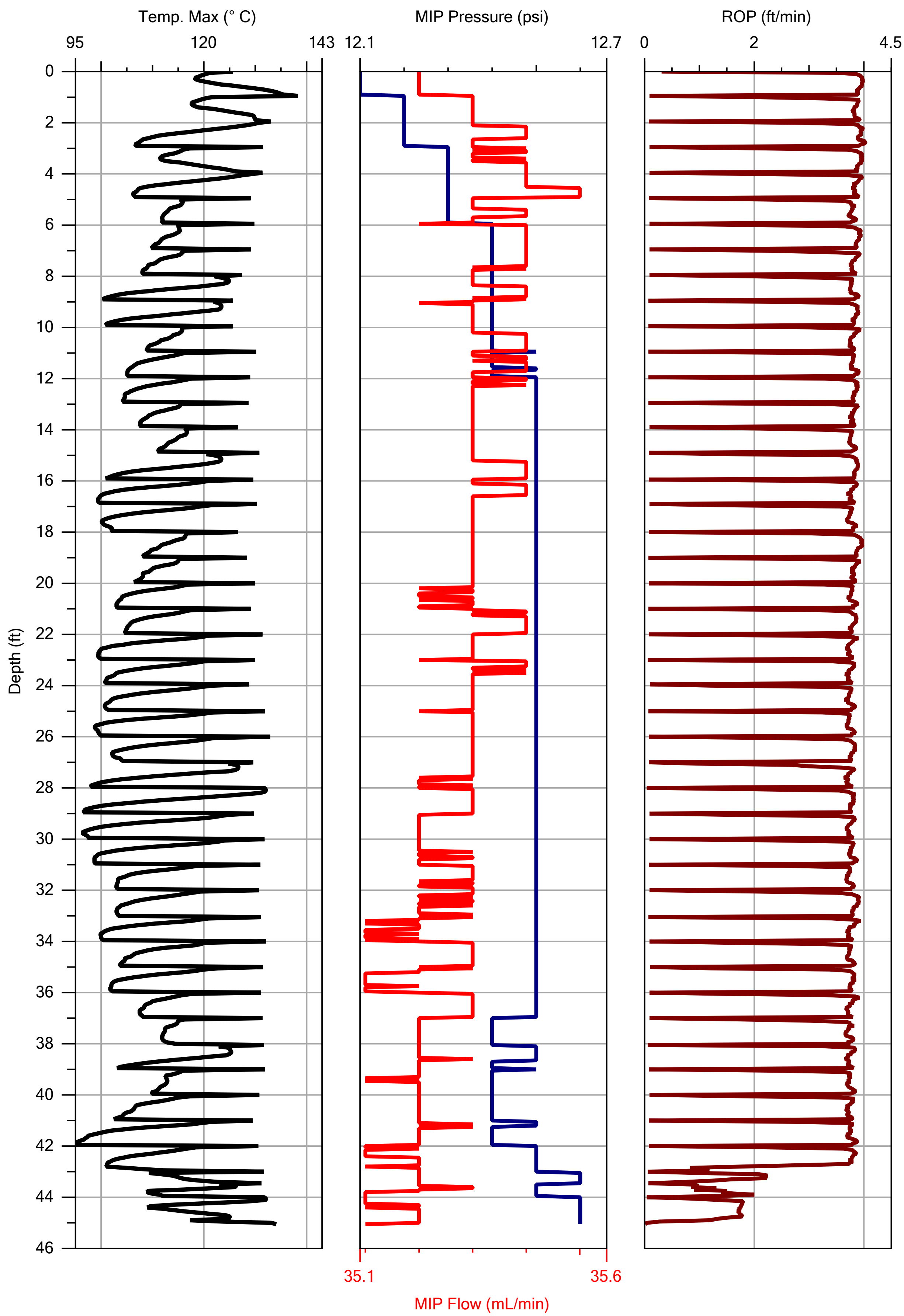
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-13.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/21/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 51′ 15″ N, 74° 57′ 52″ W



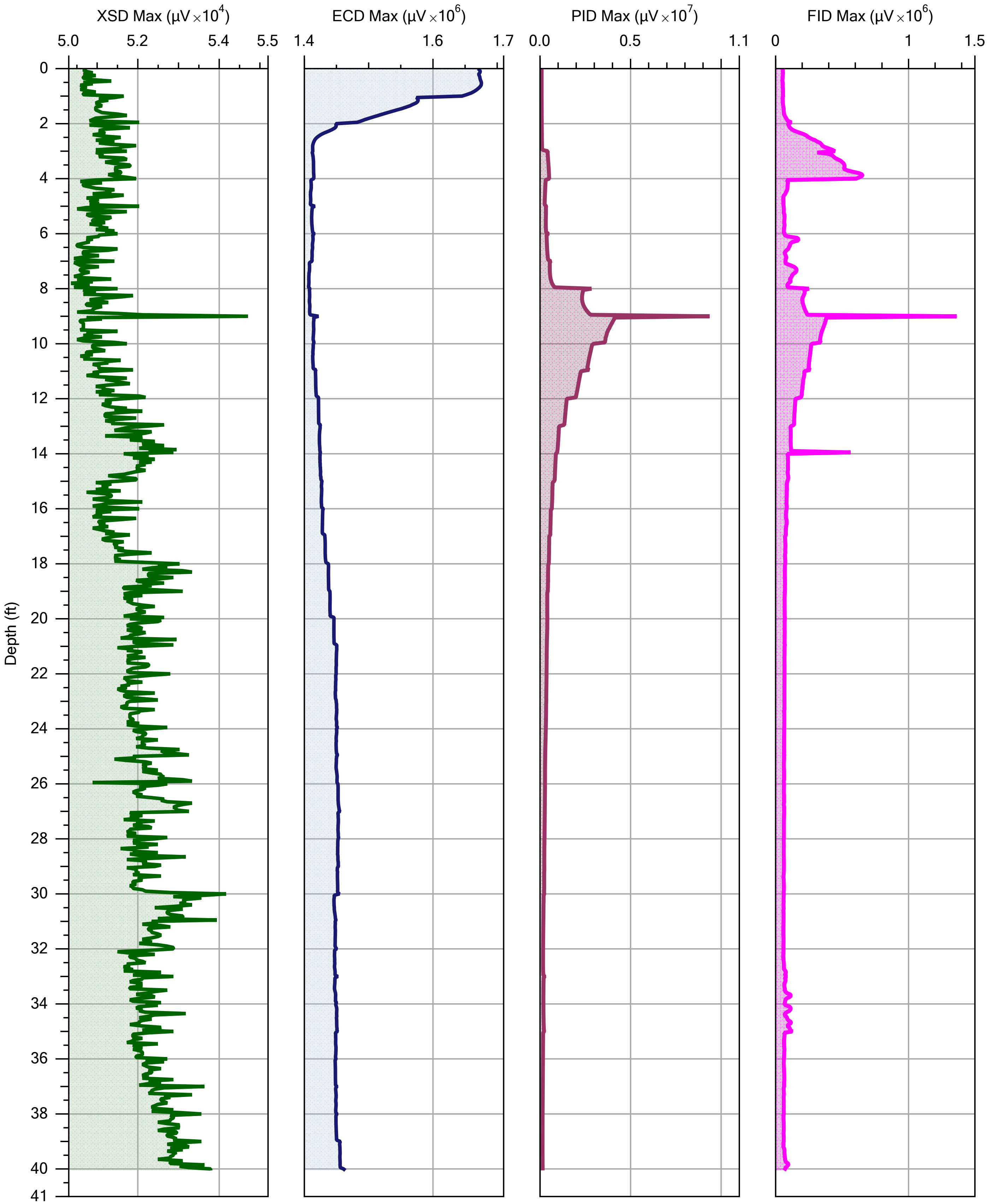
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-24.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



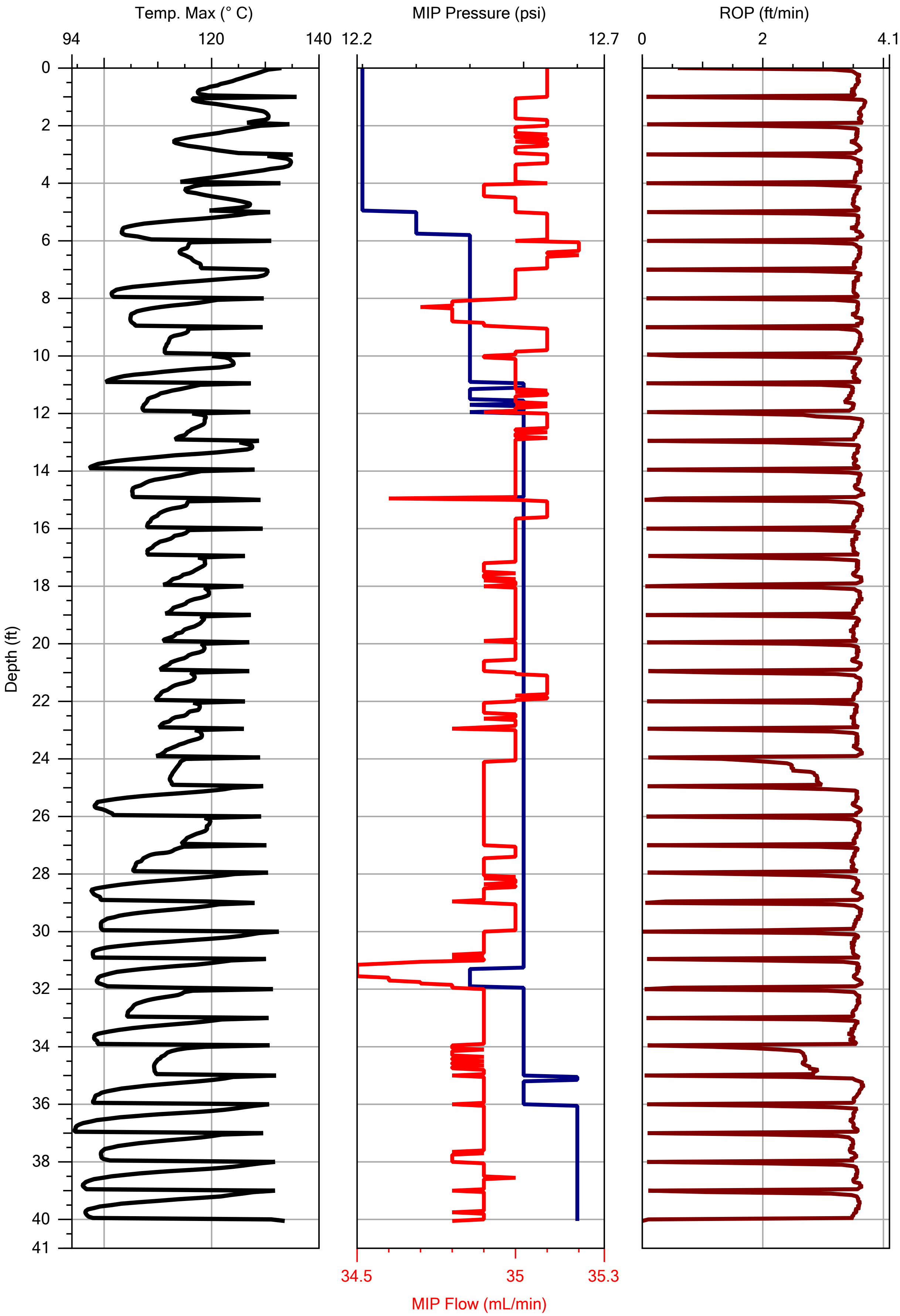
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-24.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 50″ W



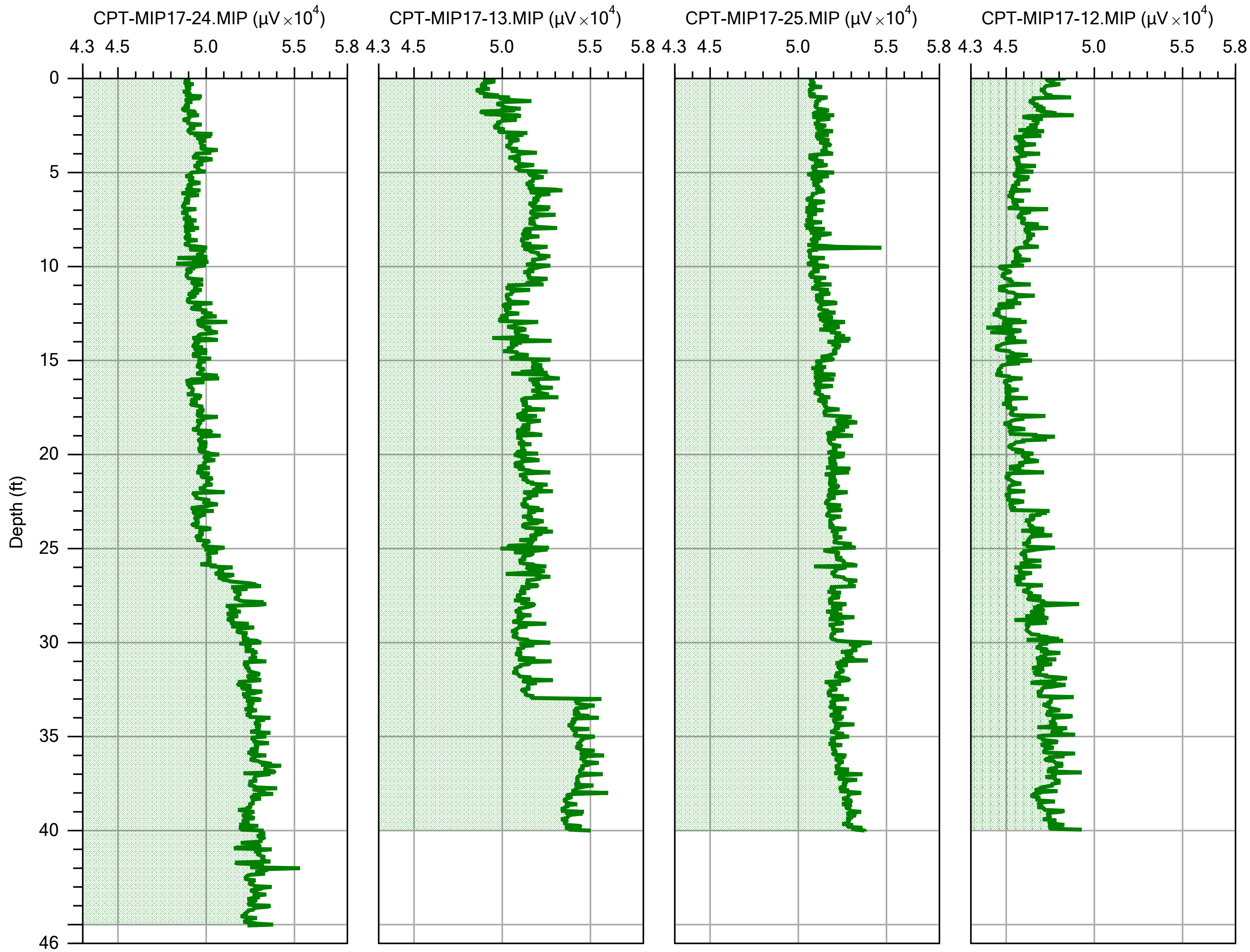
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

Company: ASC Tech Services	Operator: Jaime Ricci	File: CPT-MIP17-25.MIP
		Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 8″ N, 74° 57′ 50″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-25.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/26/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 8″ N, 74° 57′ 50″ W



CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W

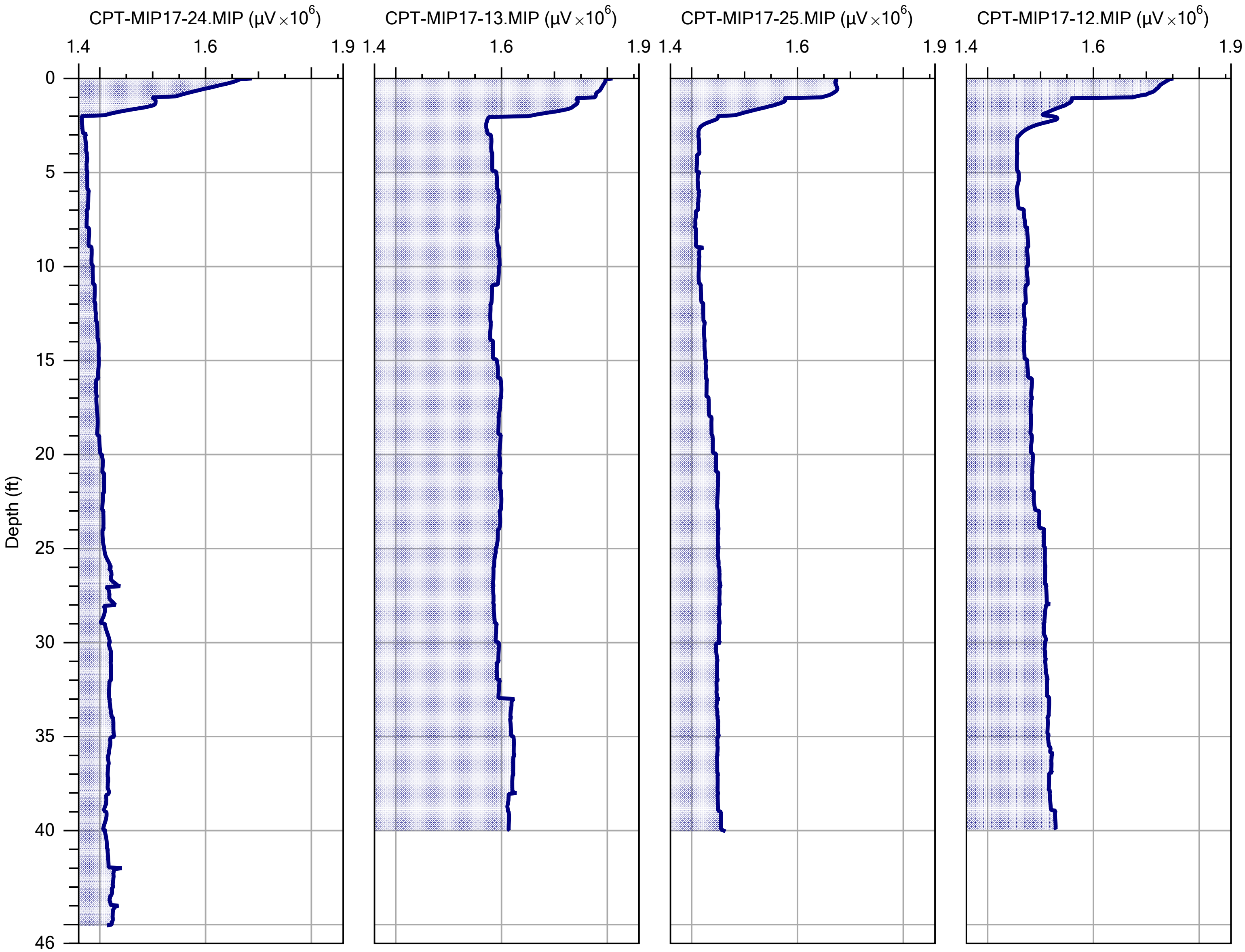
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

ECD Max

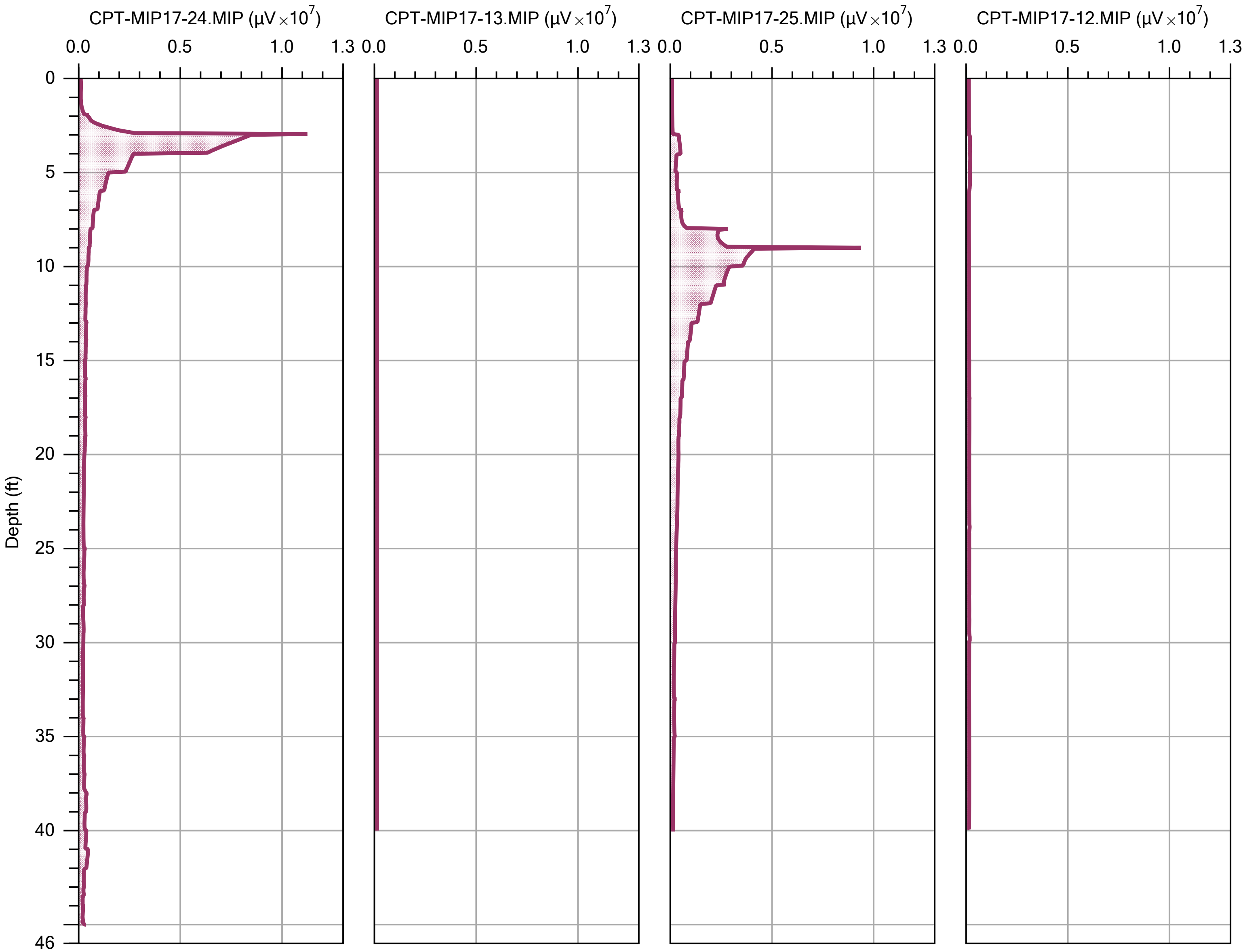
Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W



CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W

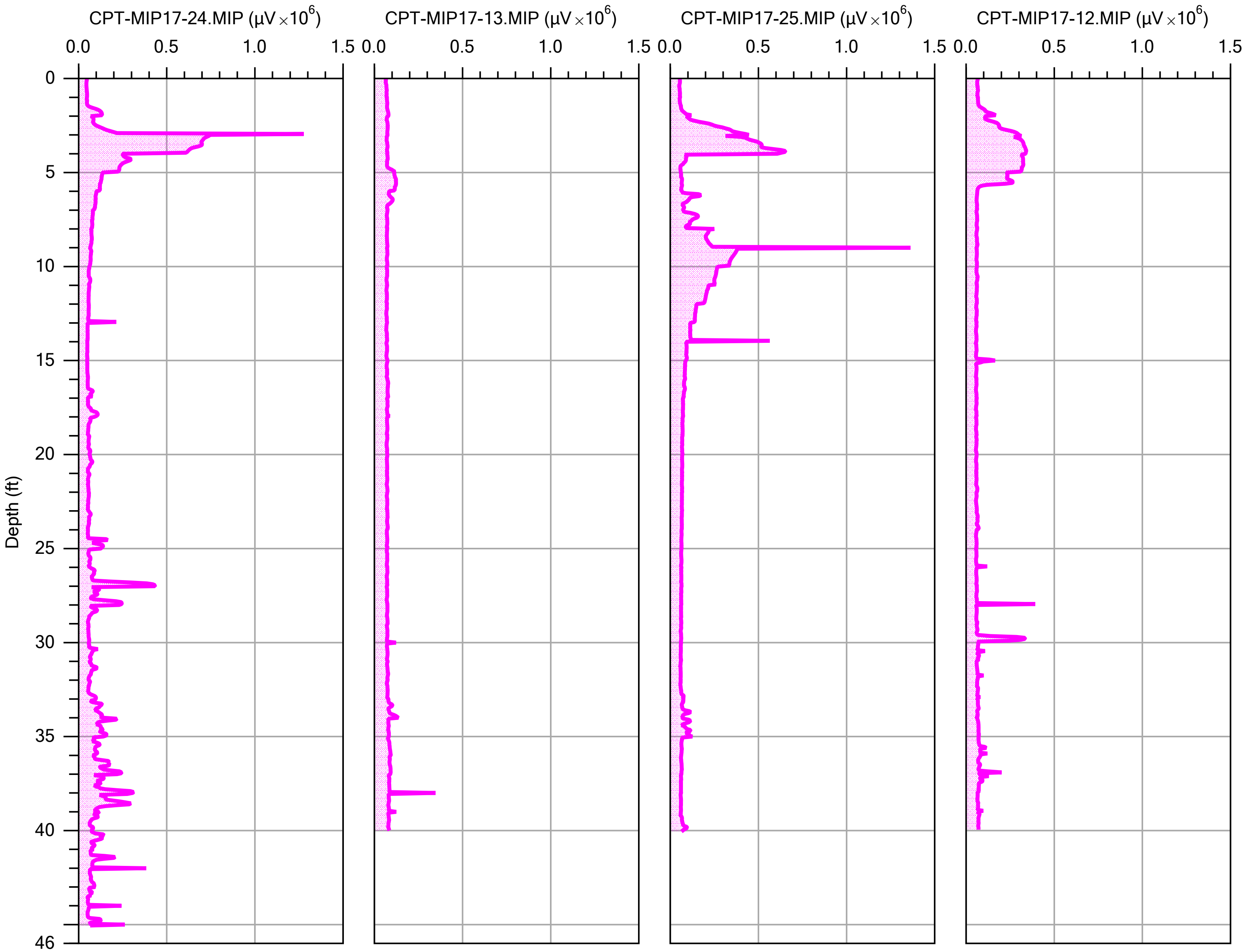
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W

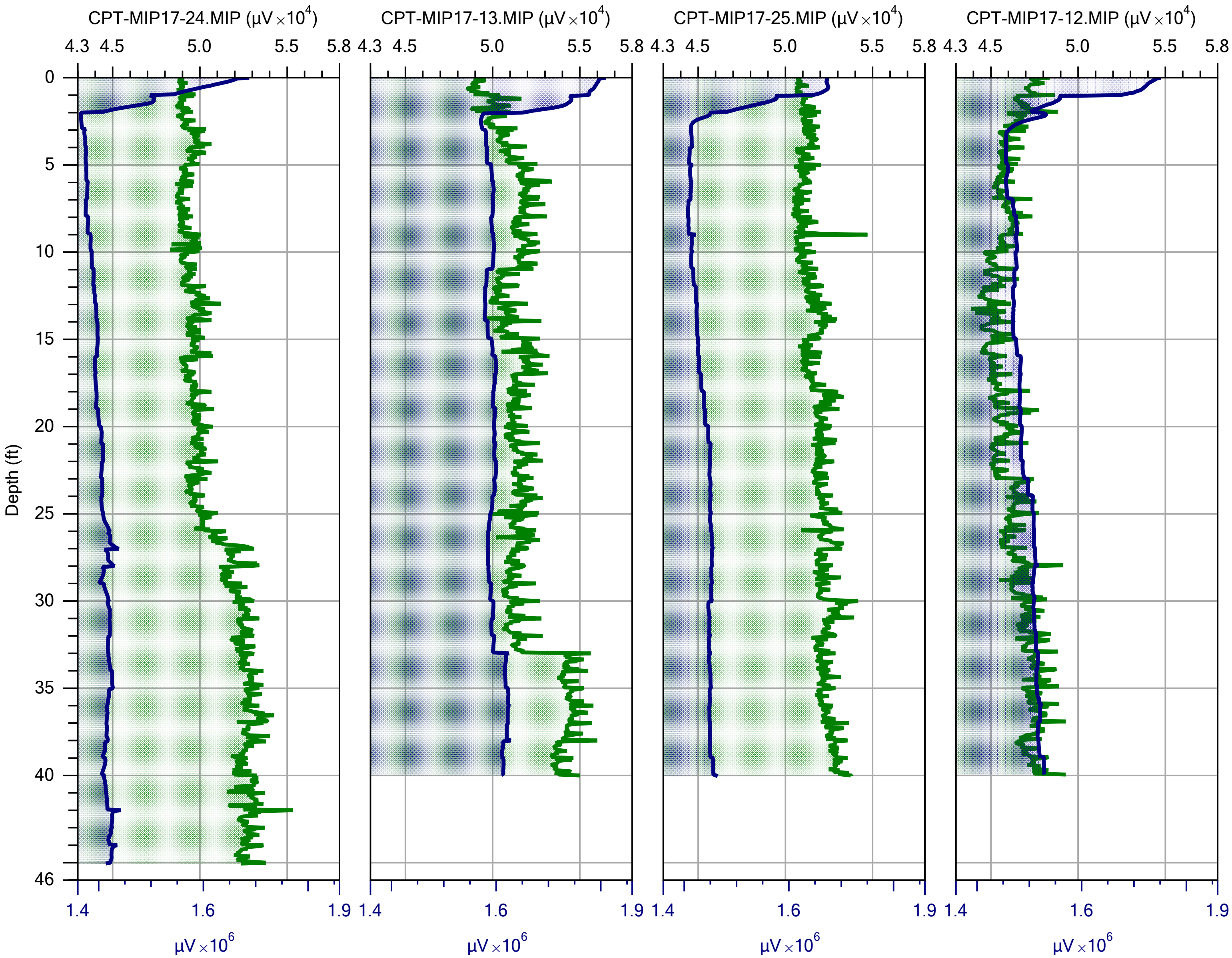
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC

ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / ECD Max

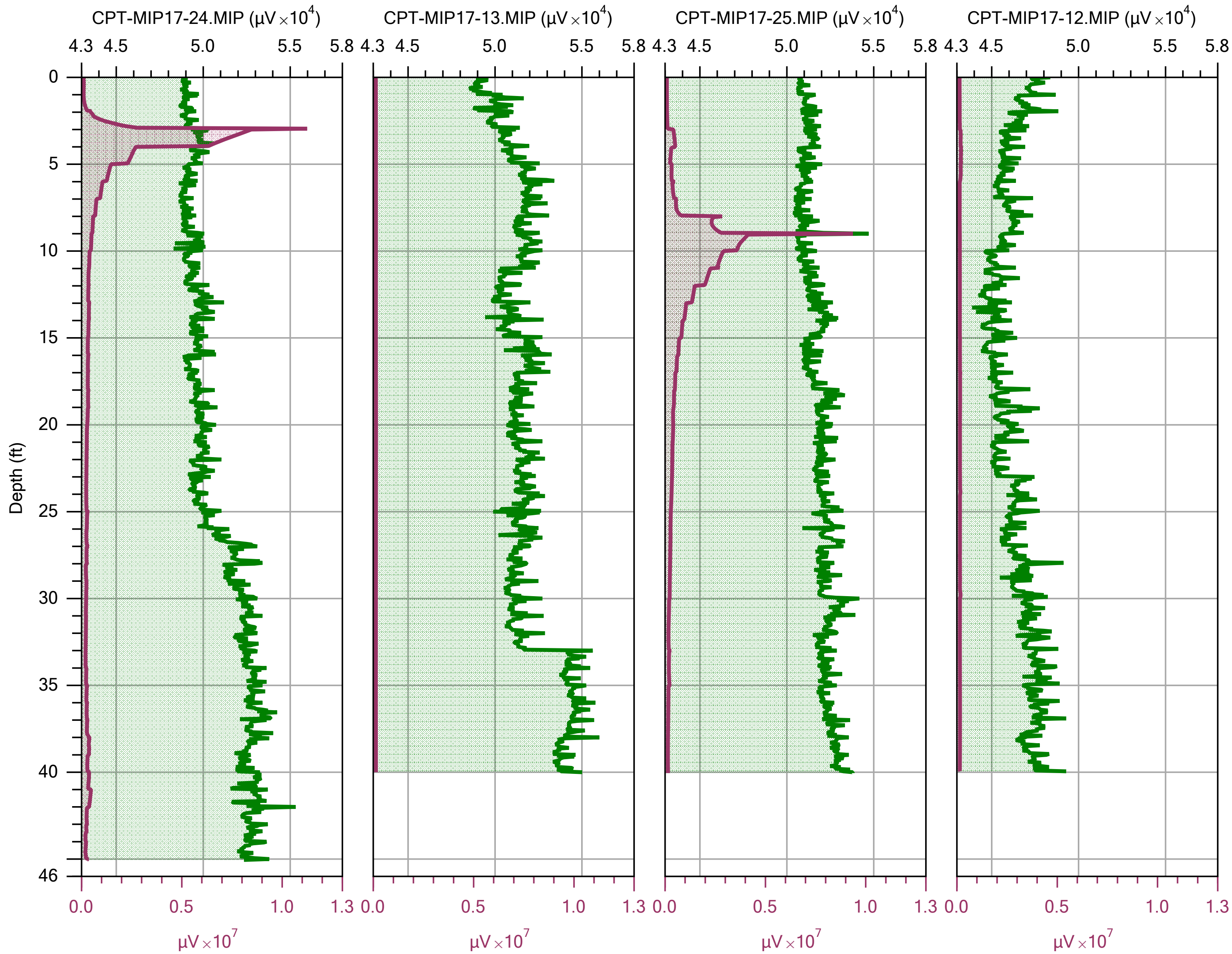
Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W



CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W

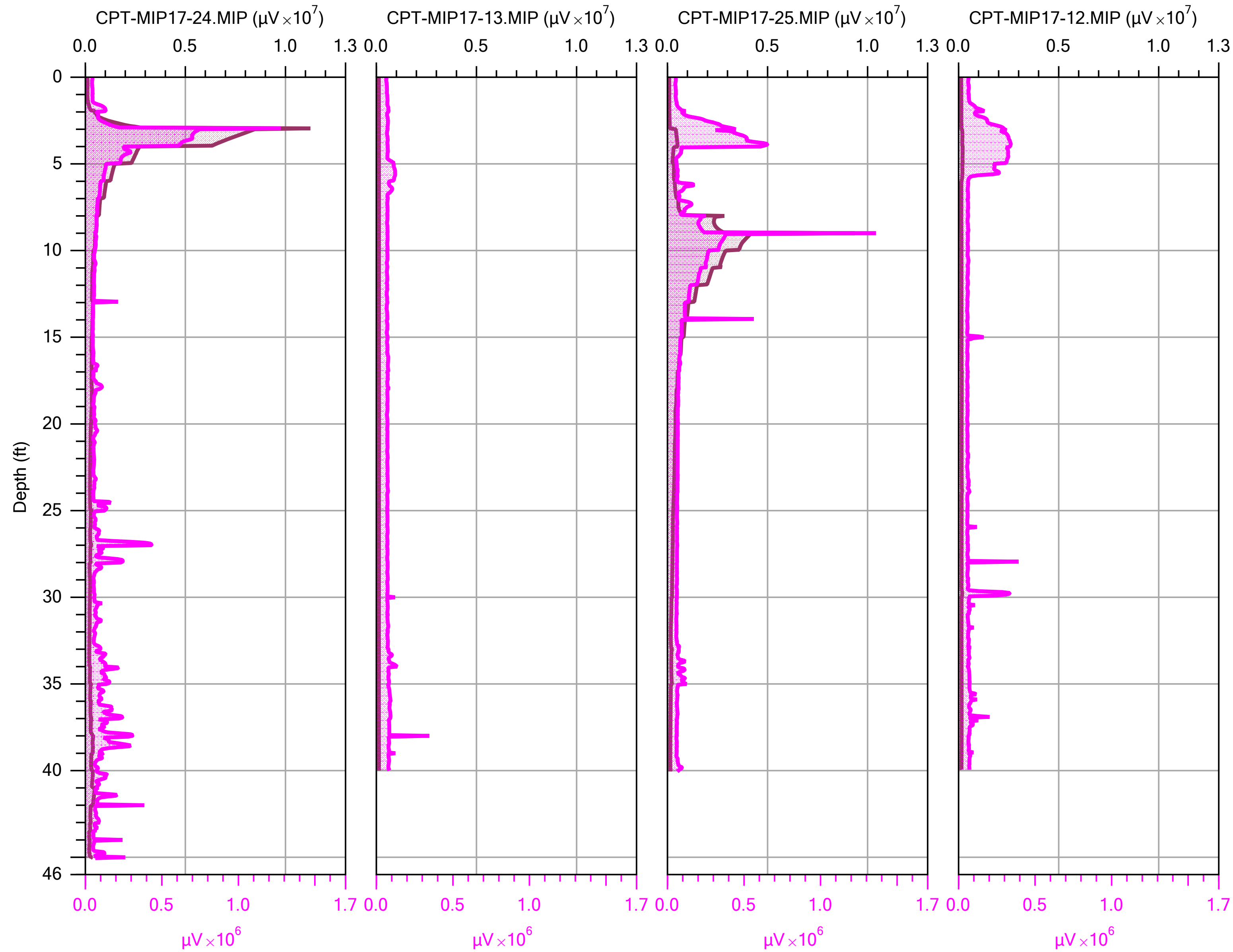
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max / FID Max

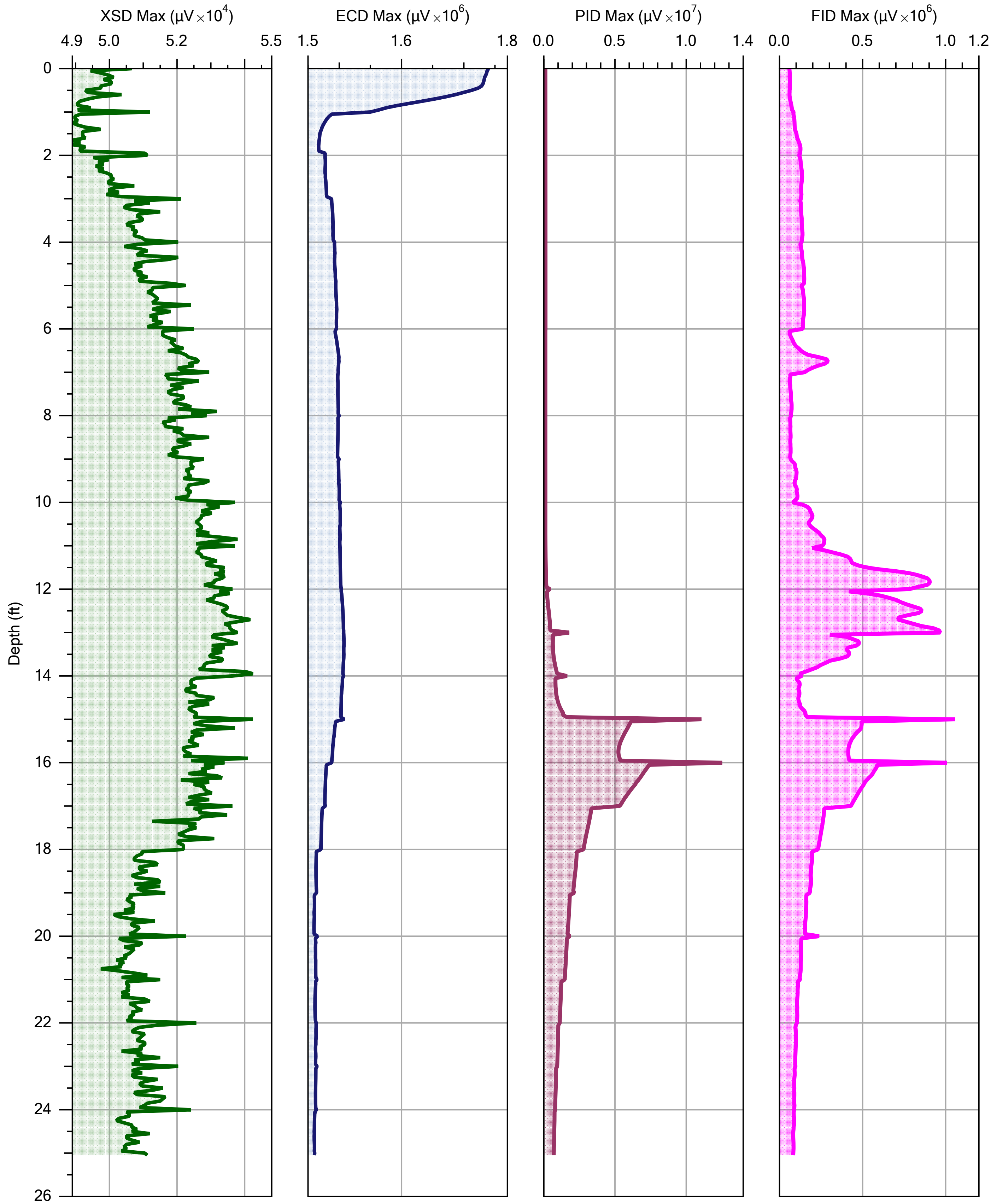
Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-24.MIP 9/26/2017
39° 50′ 9″ N, 74° 57′ 50″ W

CPT-MIP17-13.MIP 9/21/2017
39° 51′ 15″ N, 74° 57′ 52″ W

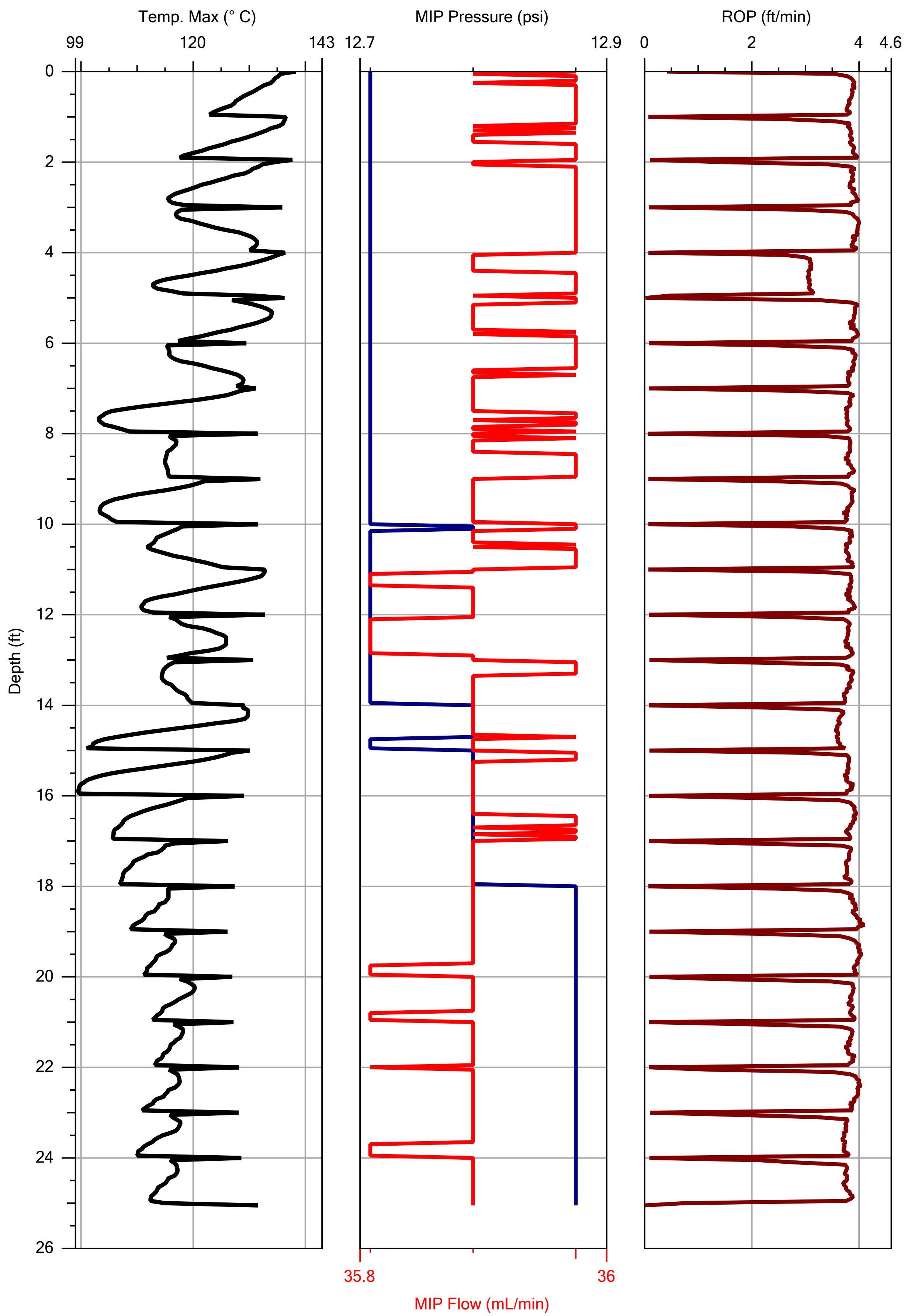
CPT-MIP17-25.MIP 9/26/2017
39° 50′ 8″ N, 74° 57′ 50″ W

CPT-MIP17-12.MIP 9/21/2017
39° 50′ 7″ N, 74° 57′ 51″ W



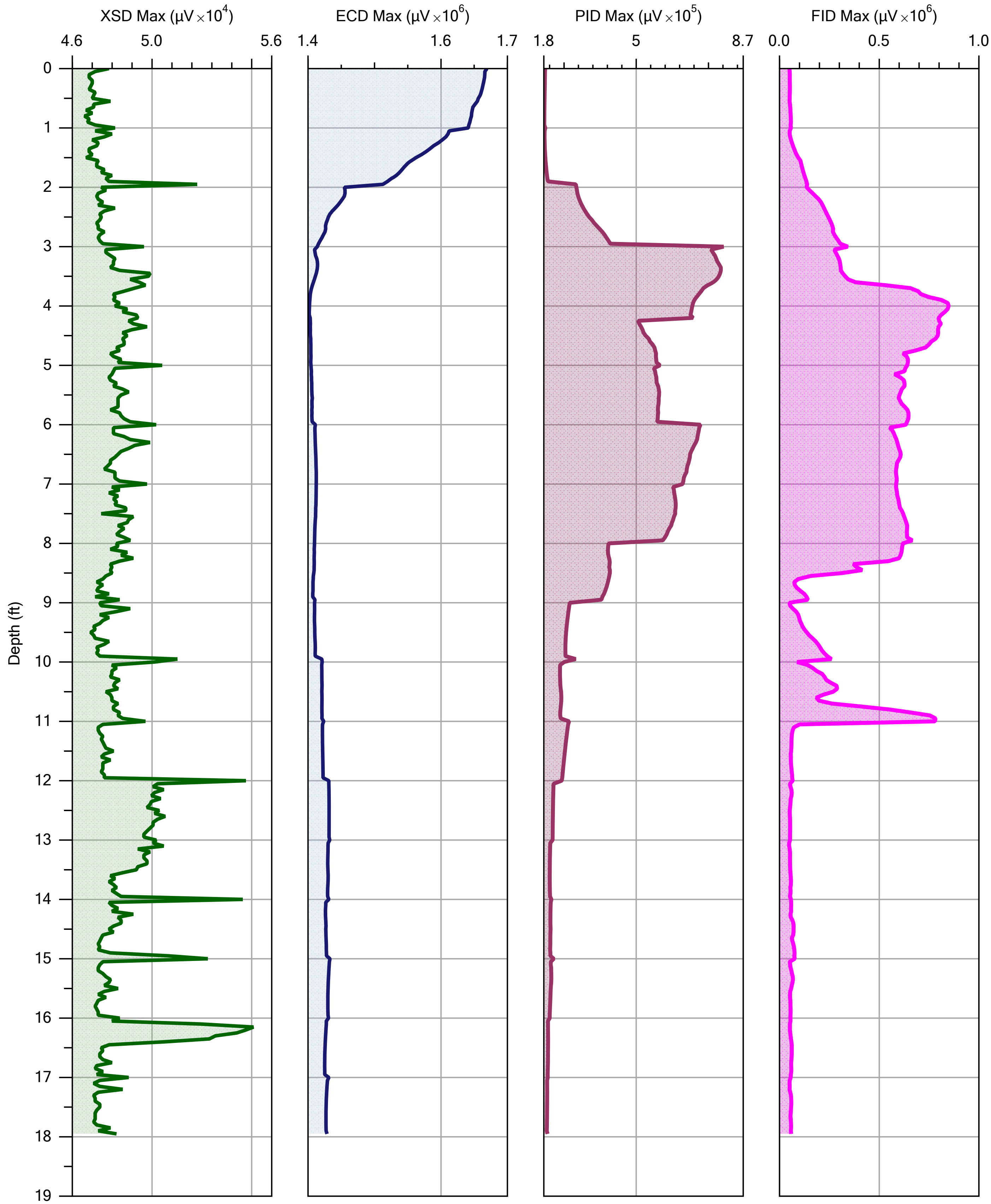
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-17.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 46″ W



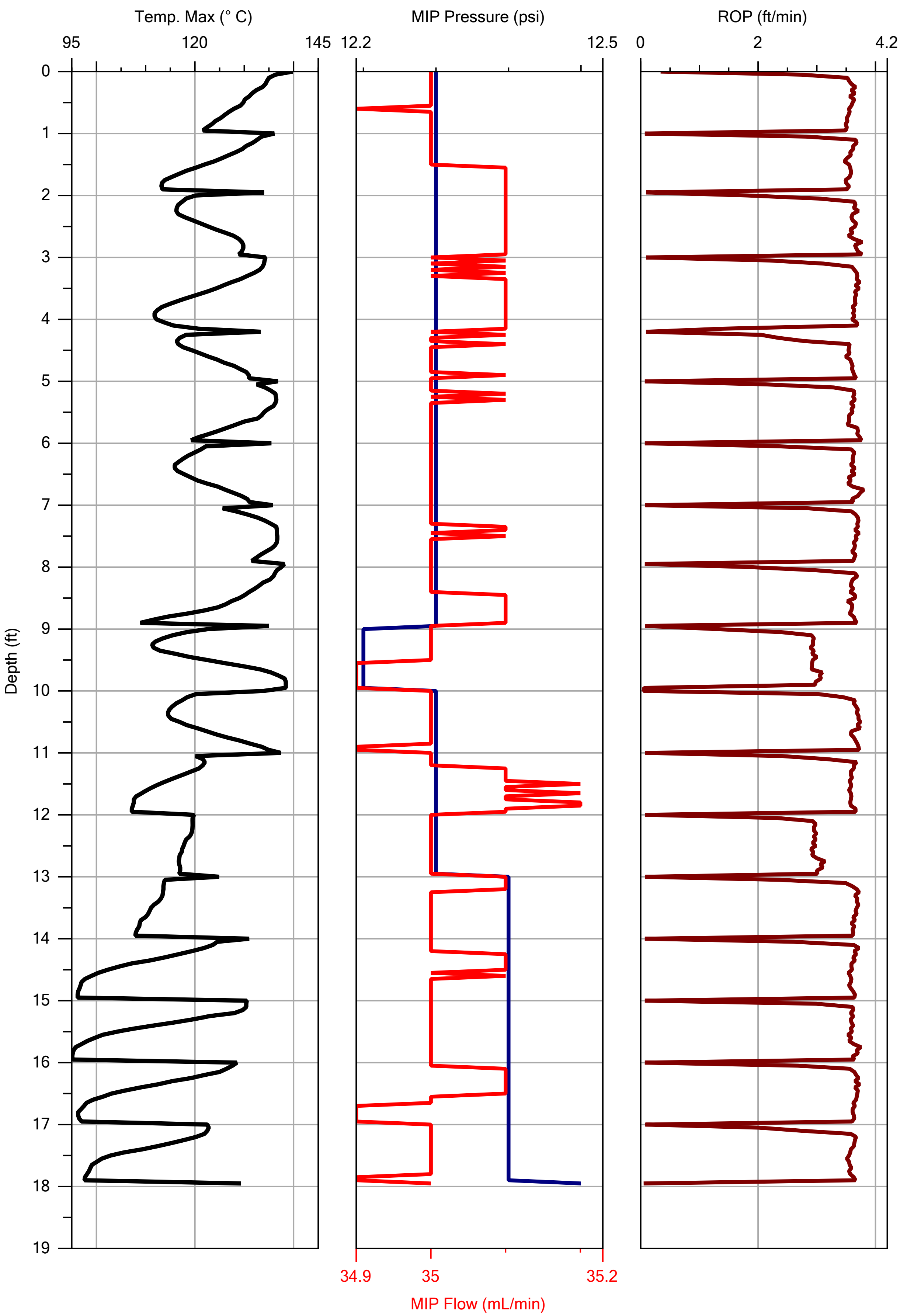
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-17.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 46″ W



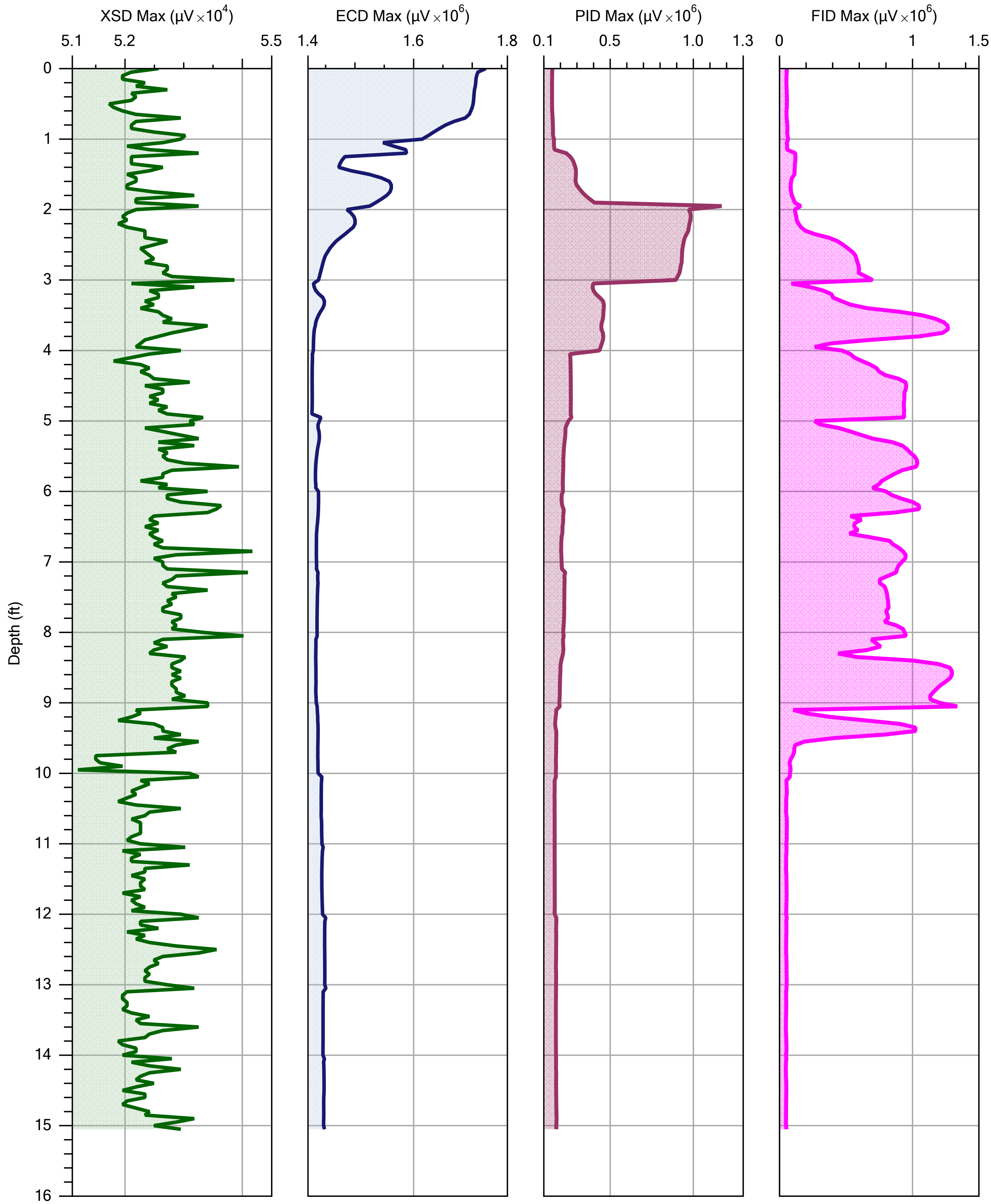
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-05.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 50″ W



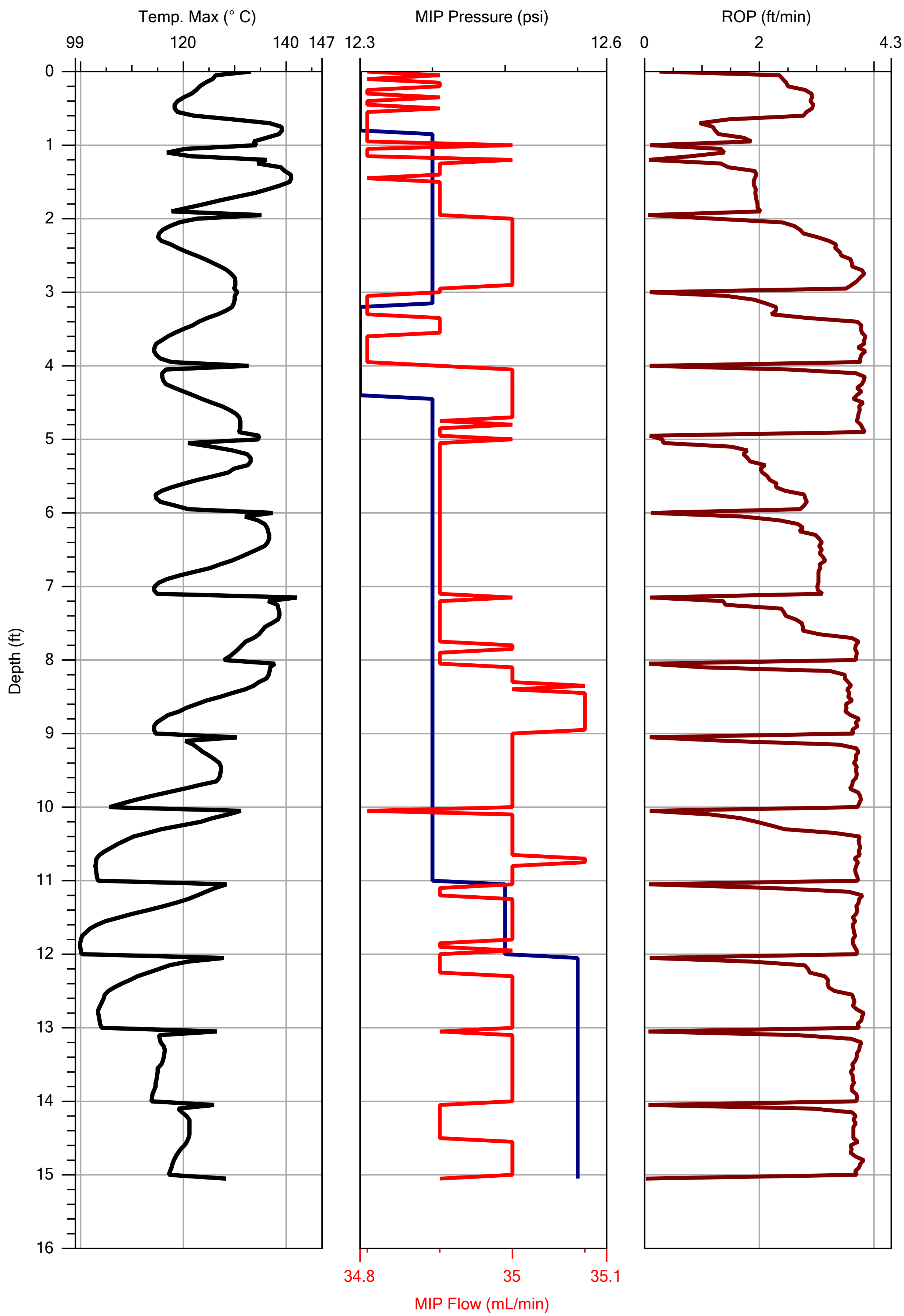
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-05.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 50″ W



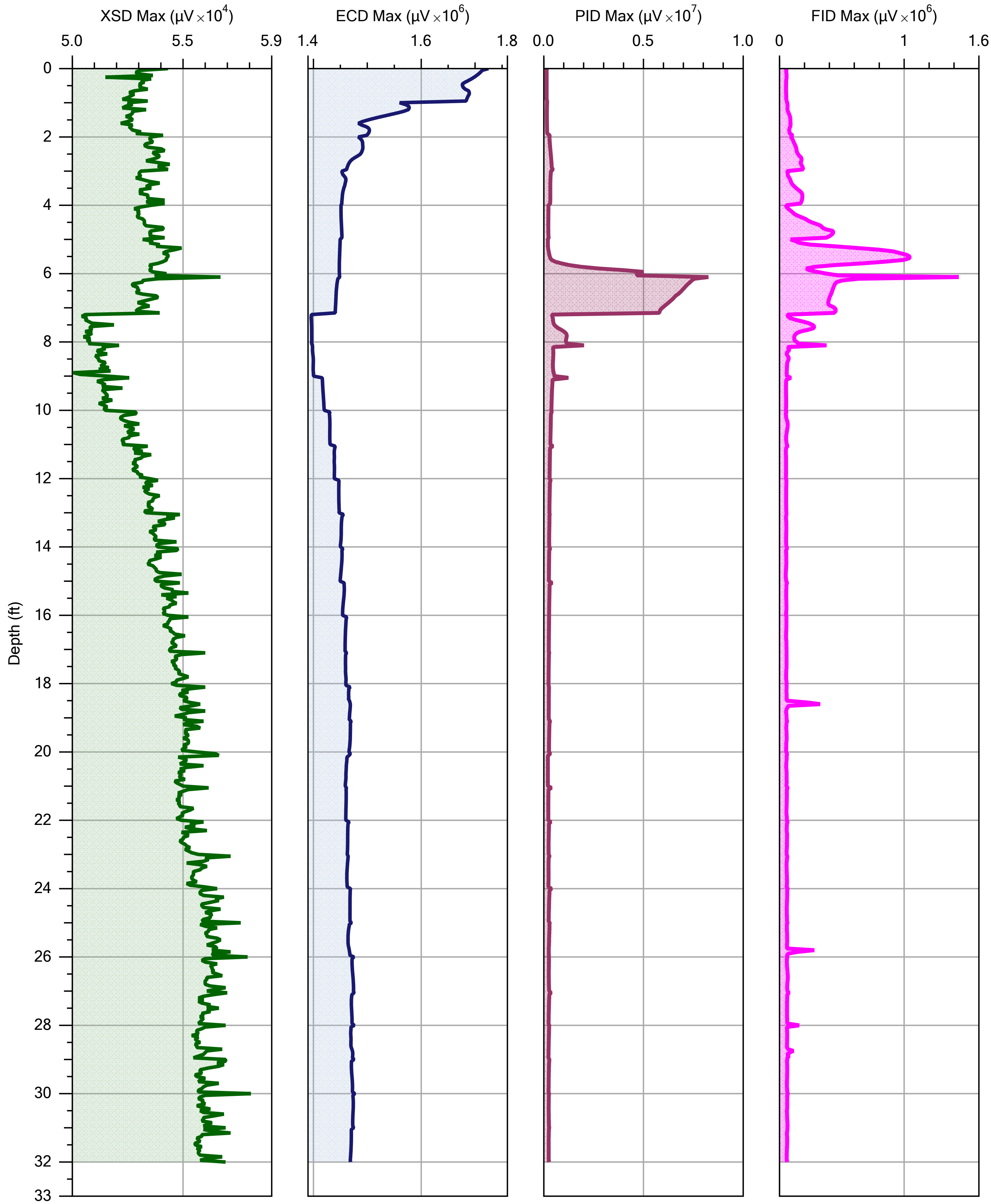
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-06.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 49″ W



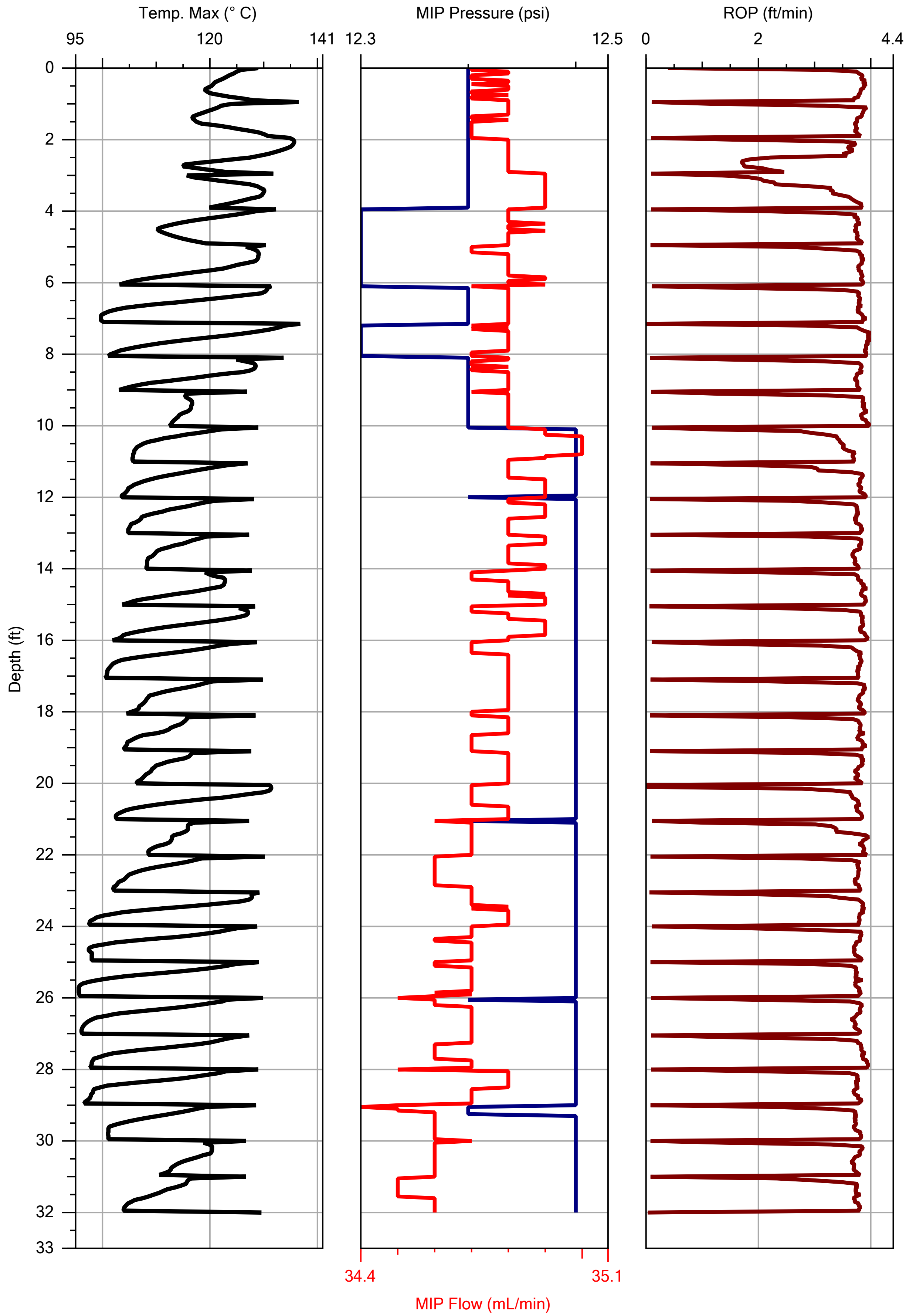
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-06.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 15″ N, 74° 57′ 49″ W



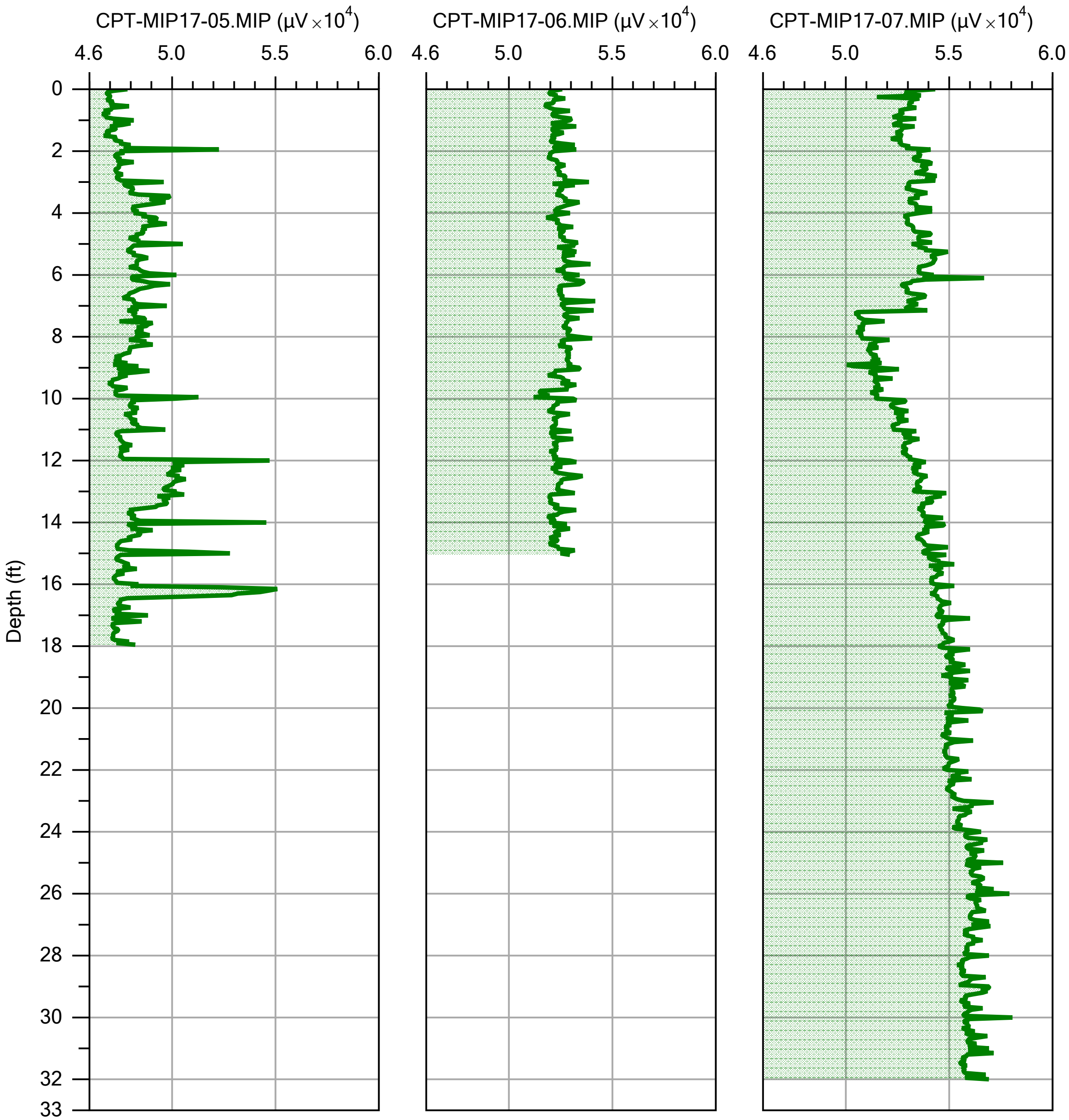
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-07.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

Company: ASC Tech Services	Operator: Jaime Ricci	File: CPT-MIP17-07.MIP Date: 9/20/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

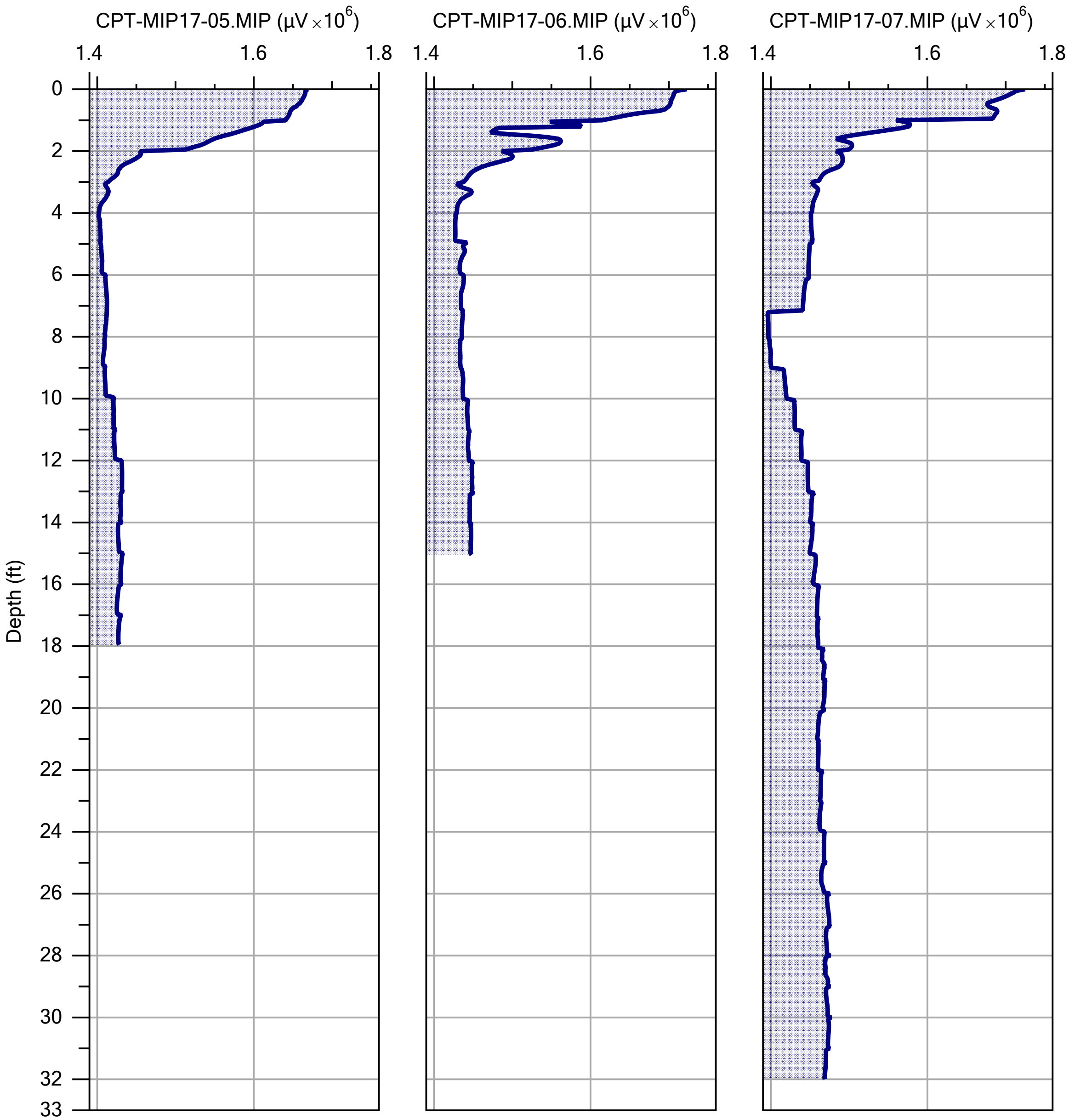
XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

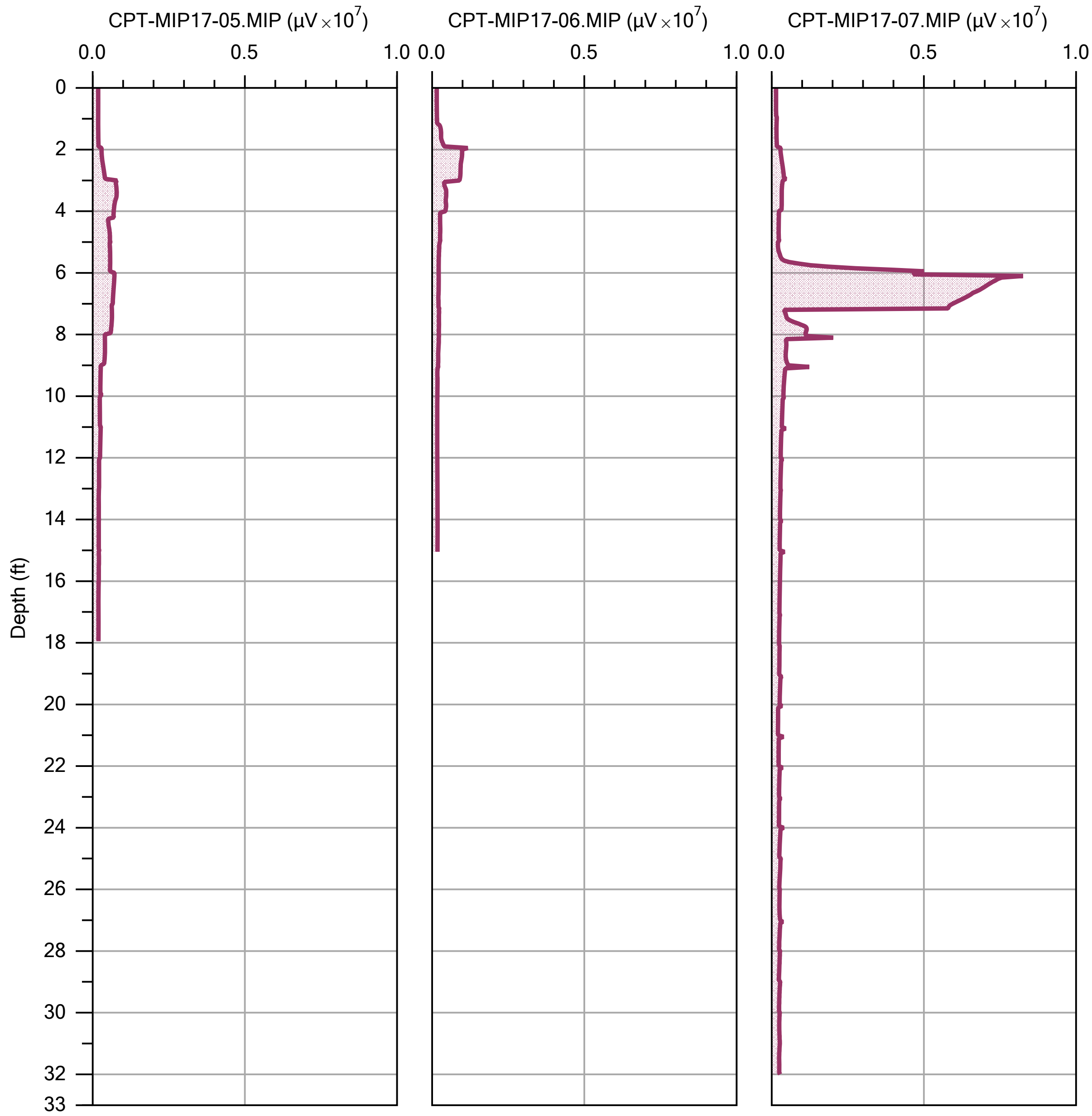
ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

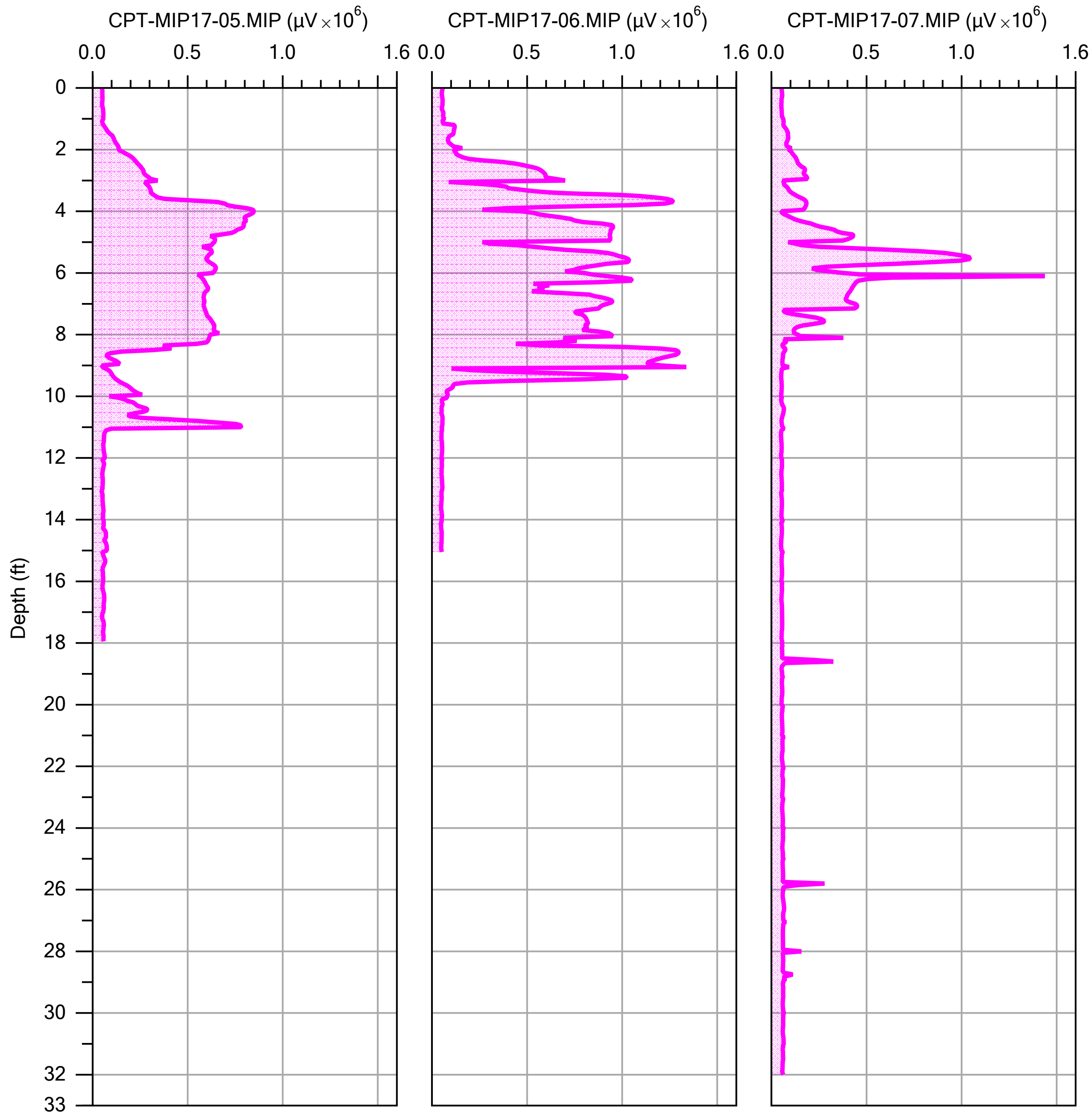
PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

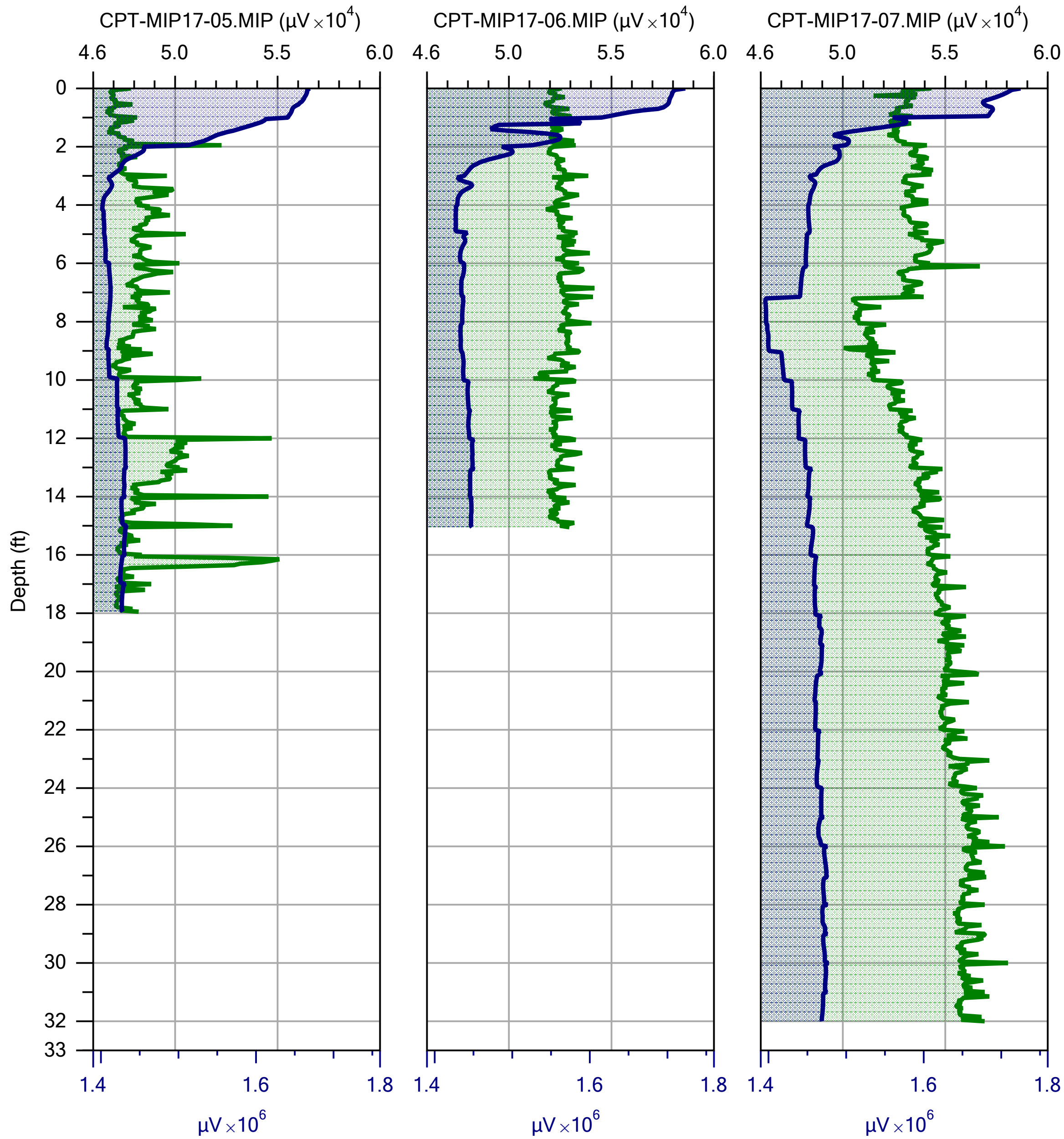
FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



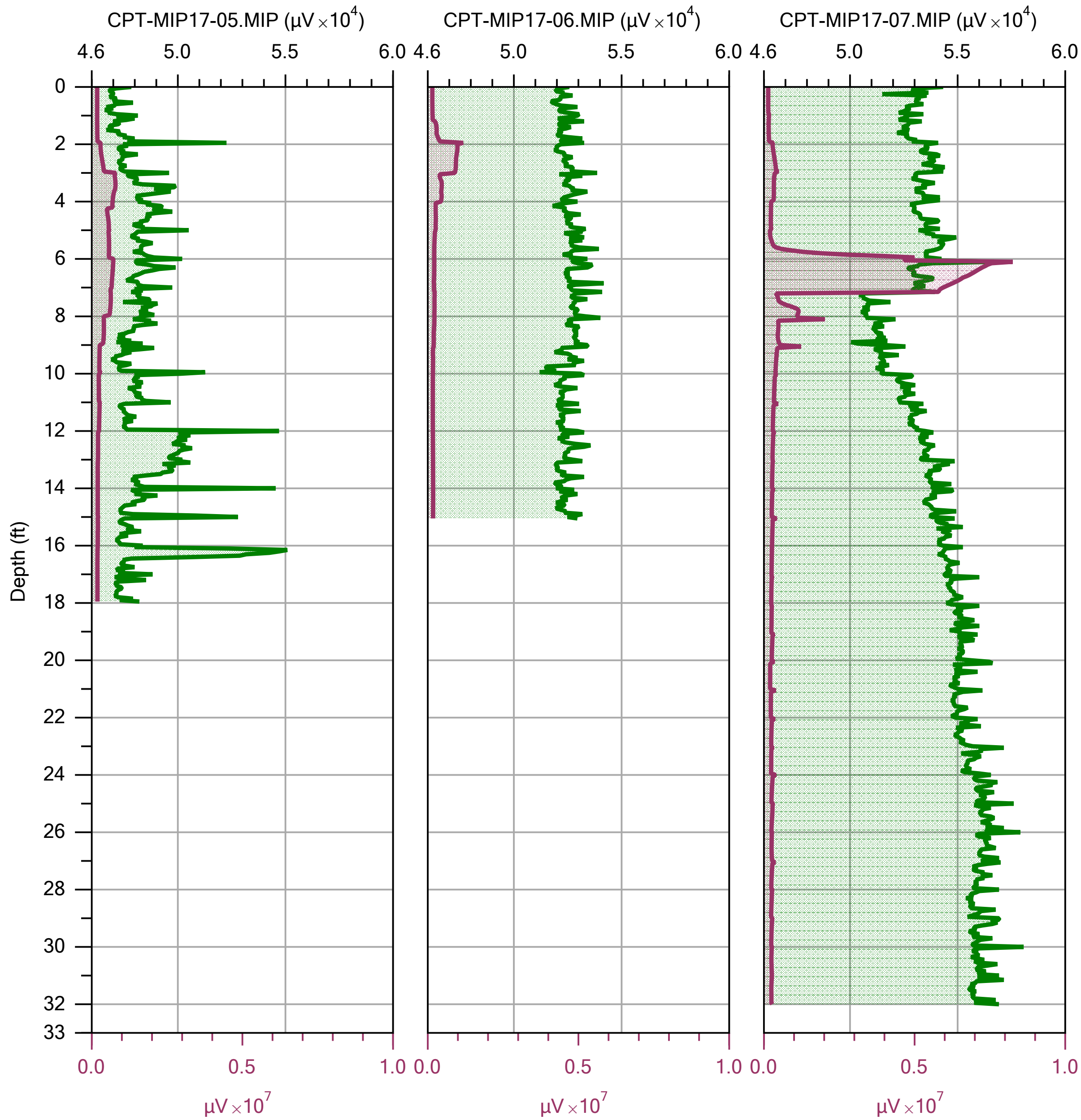
XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

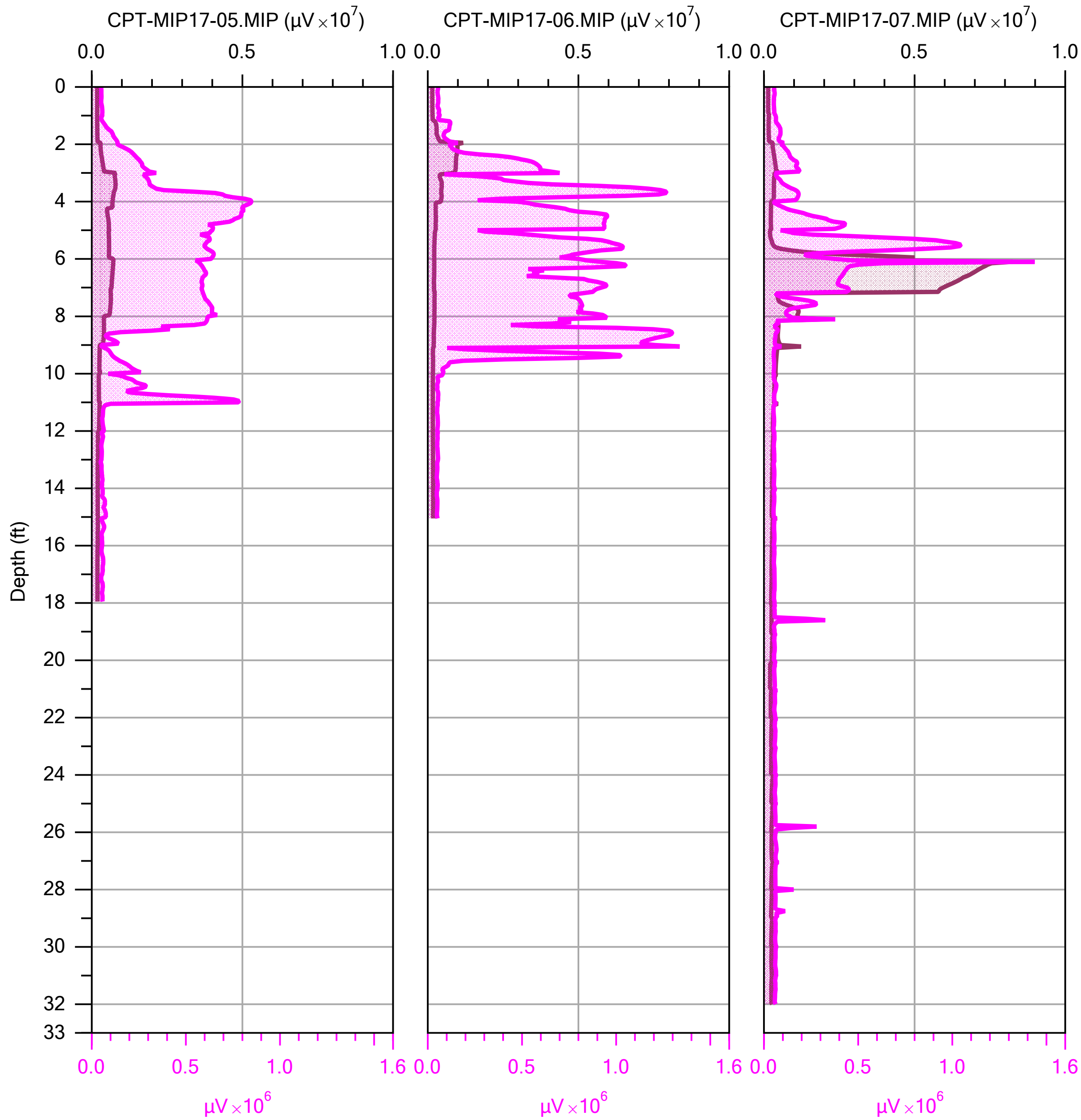
XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

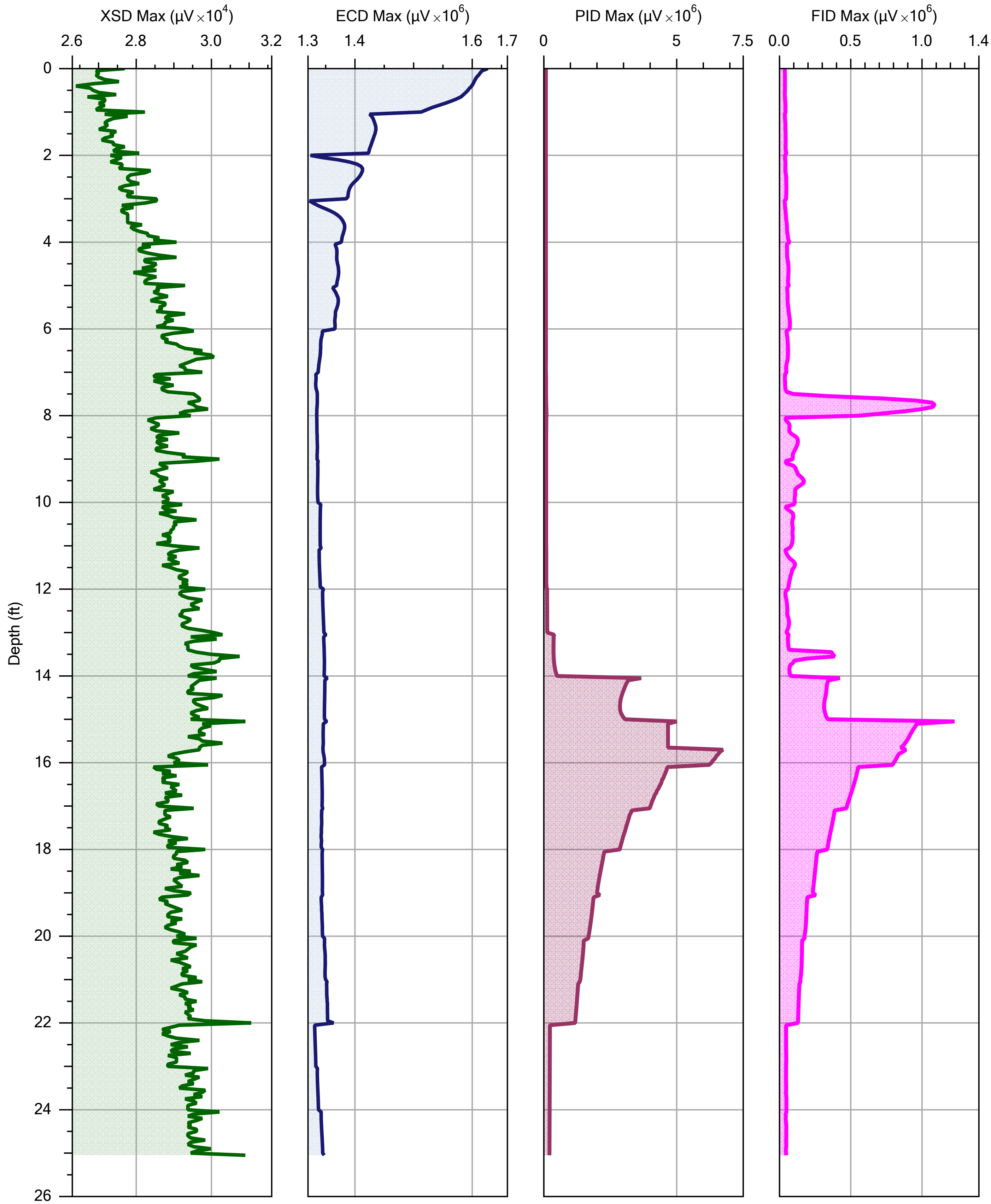
PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-05.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 50″ W

CPT-MIP17-06.MIP 9/20/2017
39° 50′ 15″ N, 74° 57′ 49″ W

CPT-MIP17-07.MIP 9/20/2017
39° 50′ 14″ N, 73° 57′ 50″ W

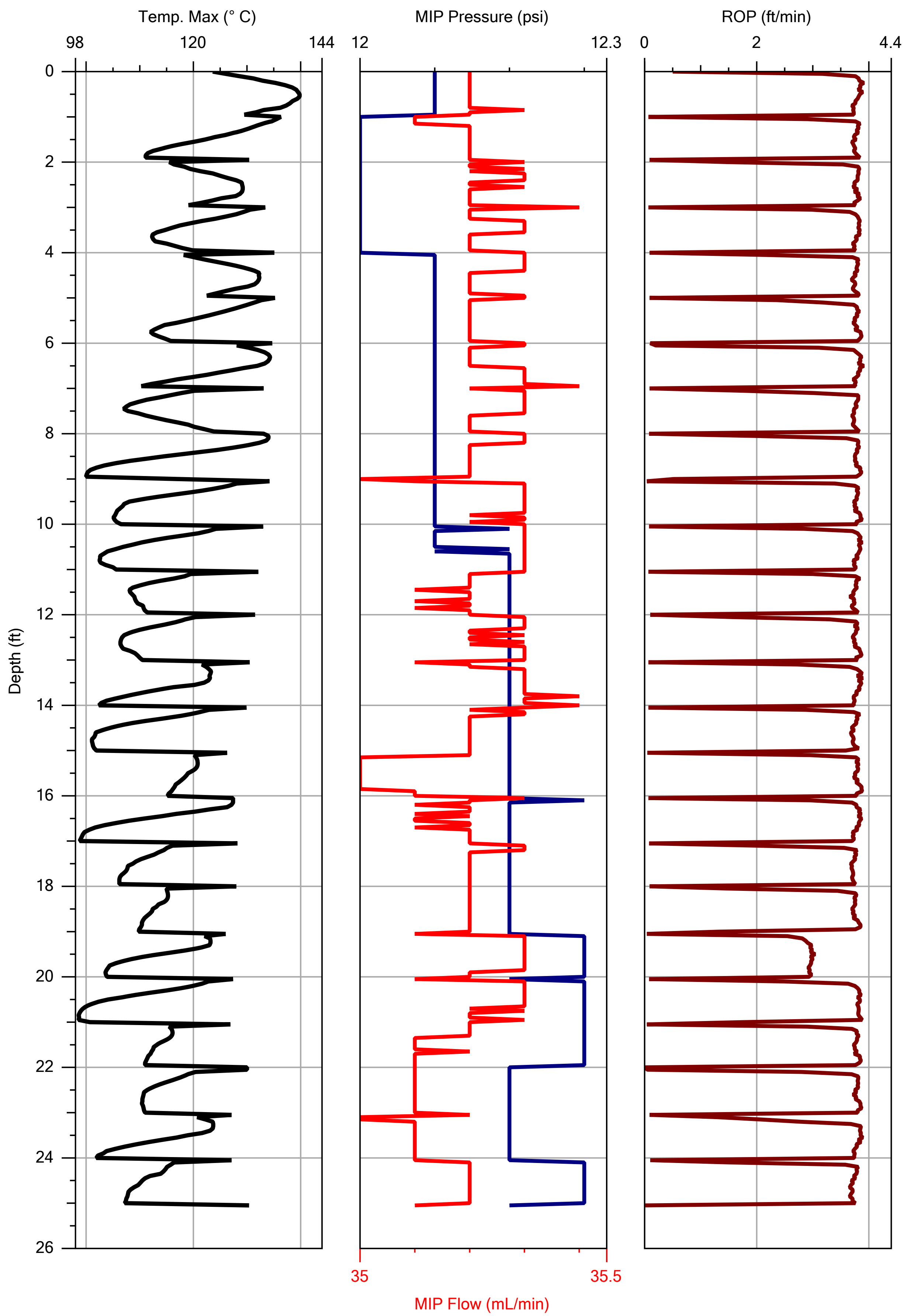


ASC Tech Services

High-Resolution Site Characterization Technologies

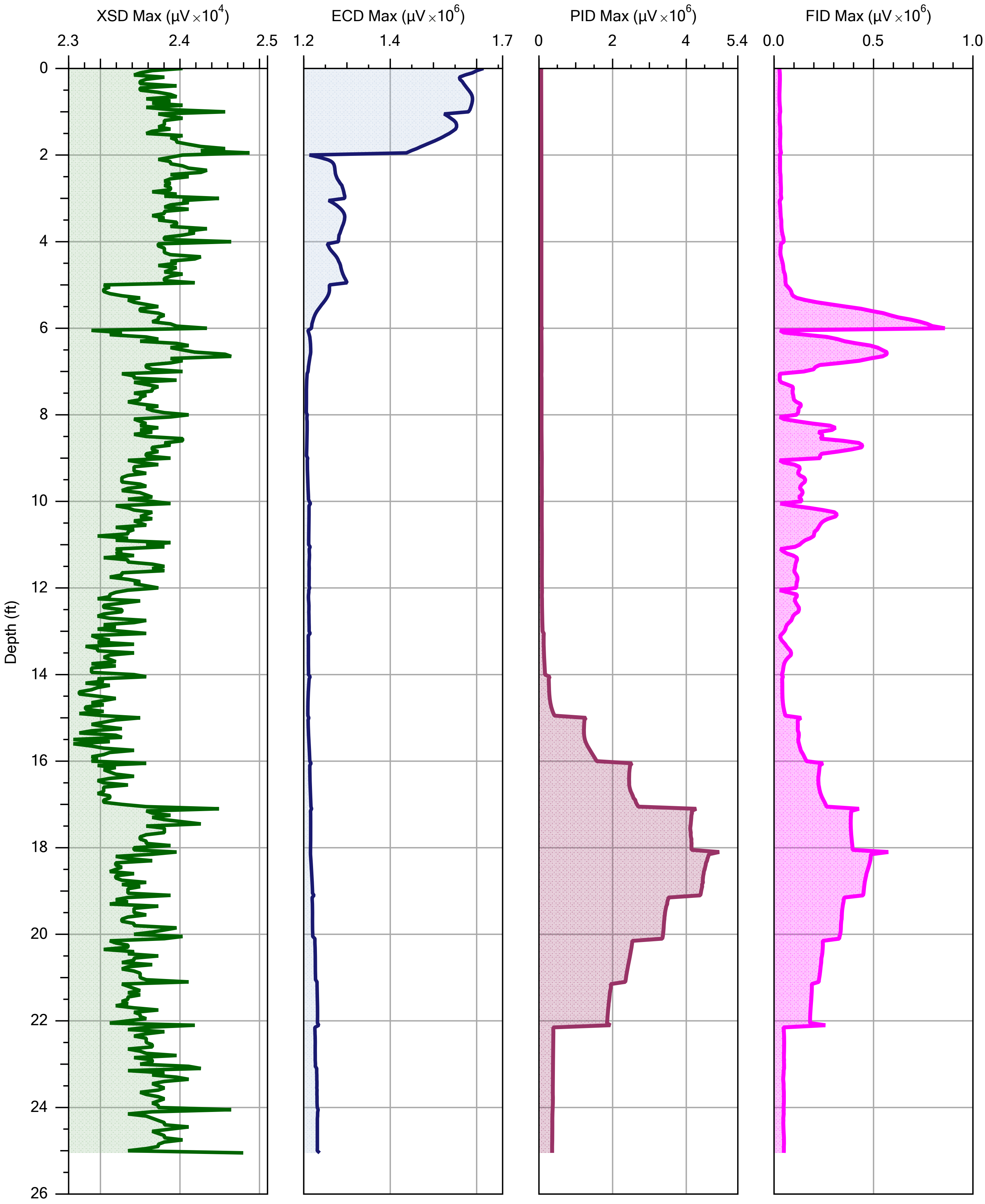
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-32.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 34° 50′ 9″ N, 74° 57′ 45″ W



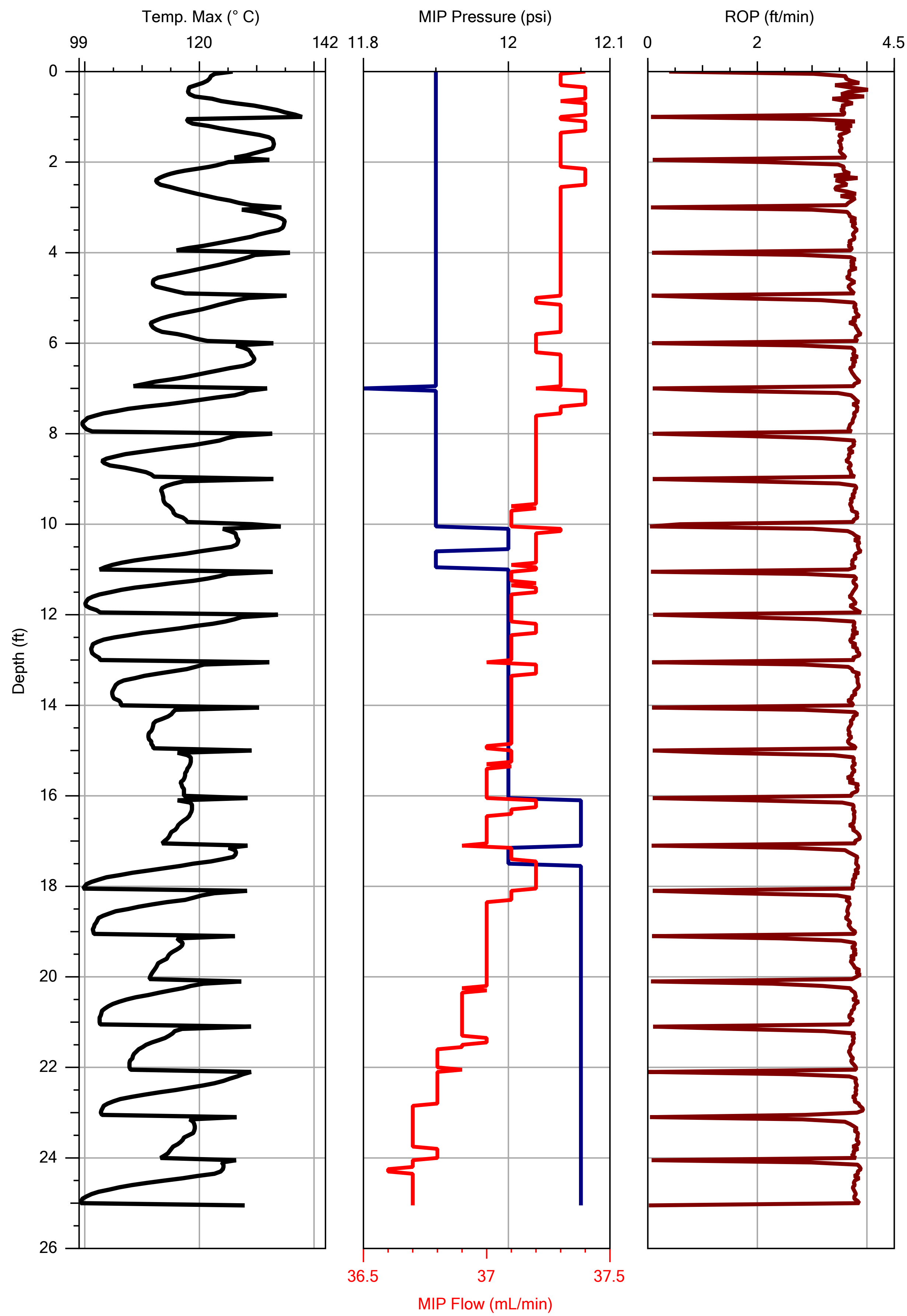
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-32.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 34° 50′ 9″ N, 74° 57′ 45″ W



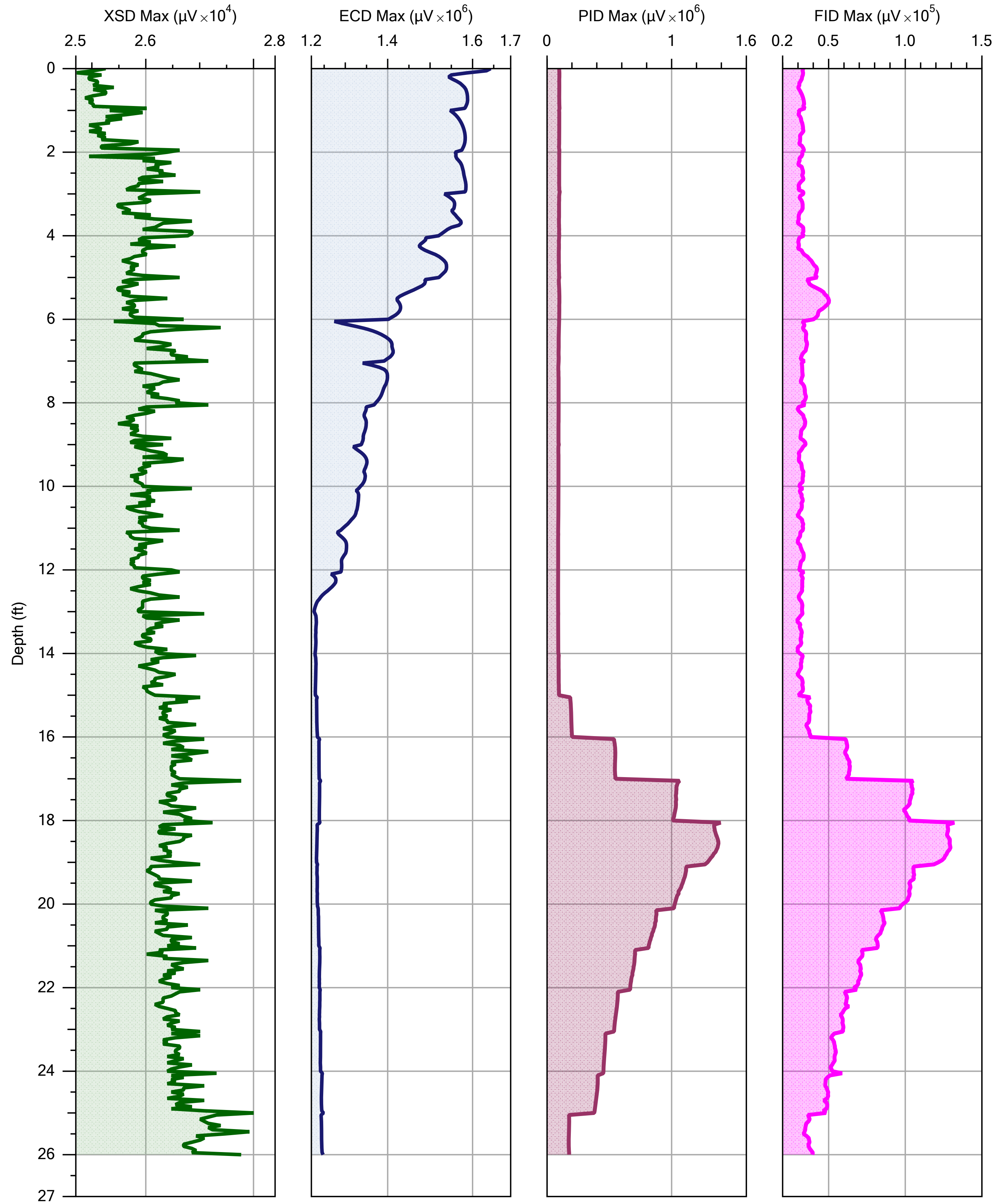
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-33.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 47″ W



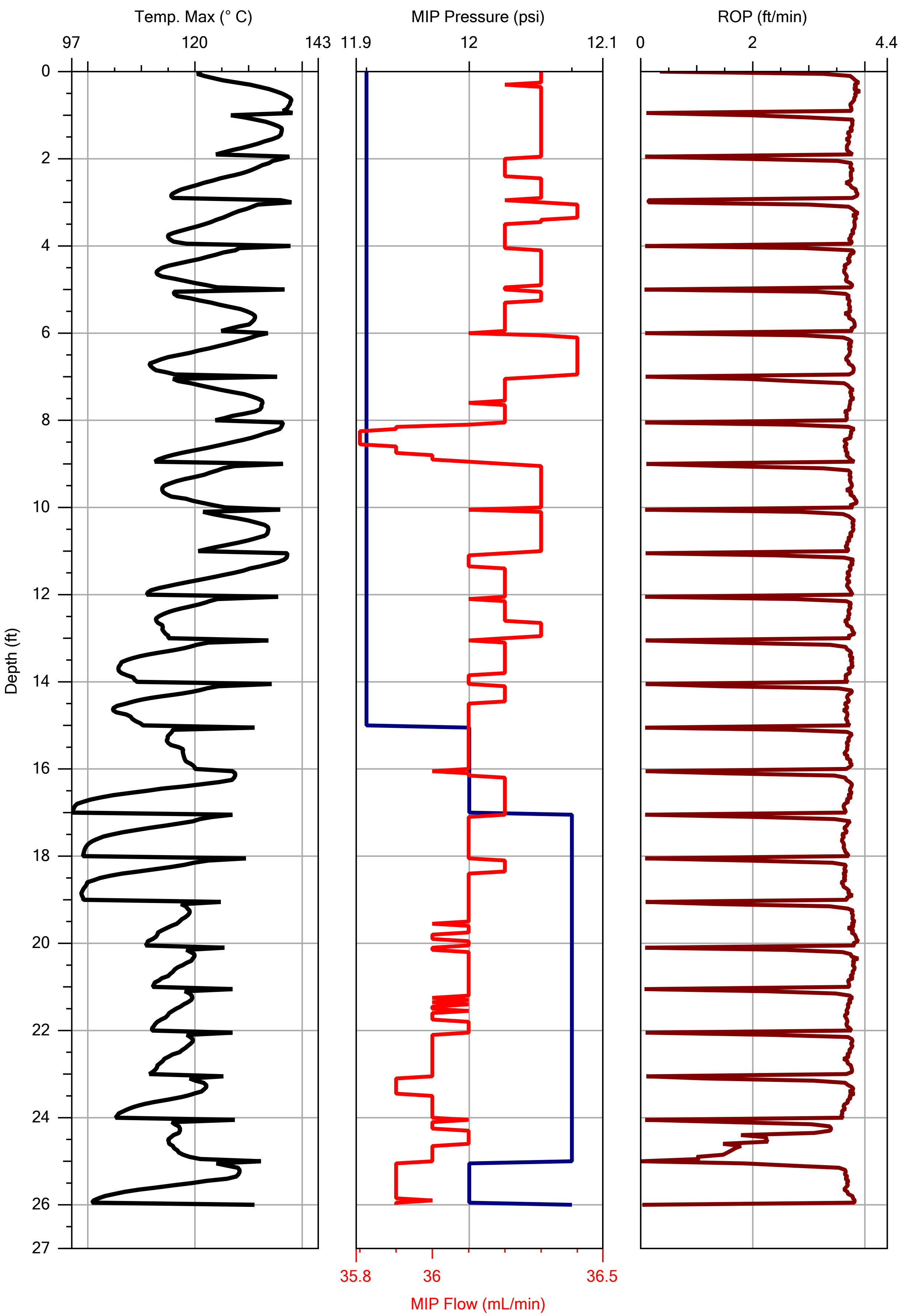
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

Company: ASC Tech Services	Operator: Jaime Ricci	File: CPT-MIP17-33.MIP
		Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 47″ W



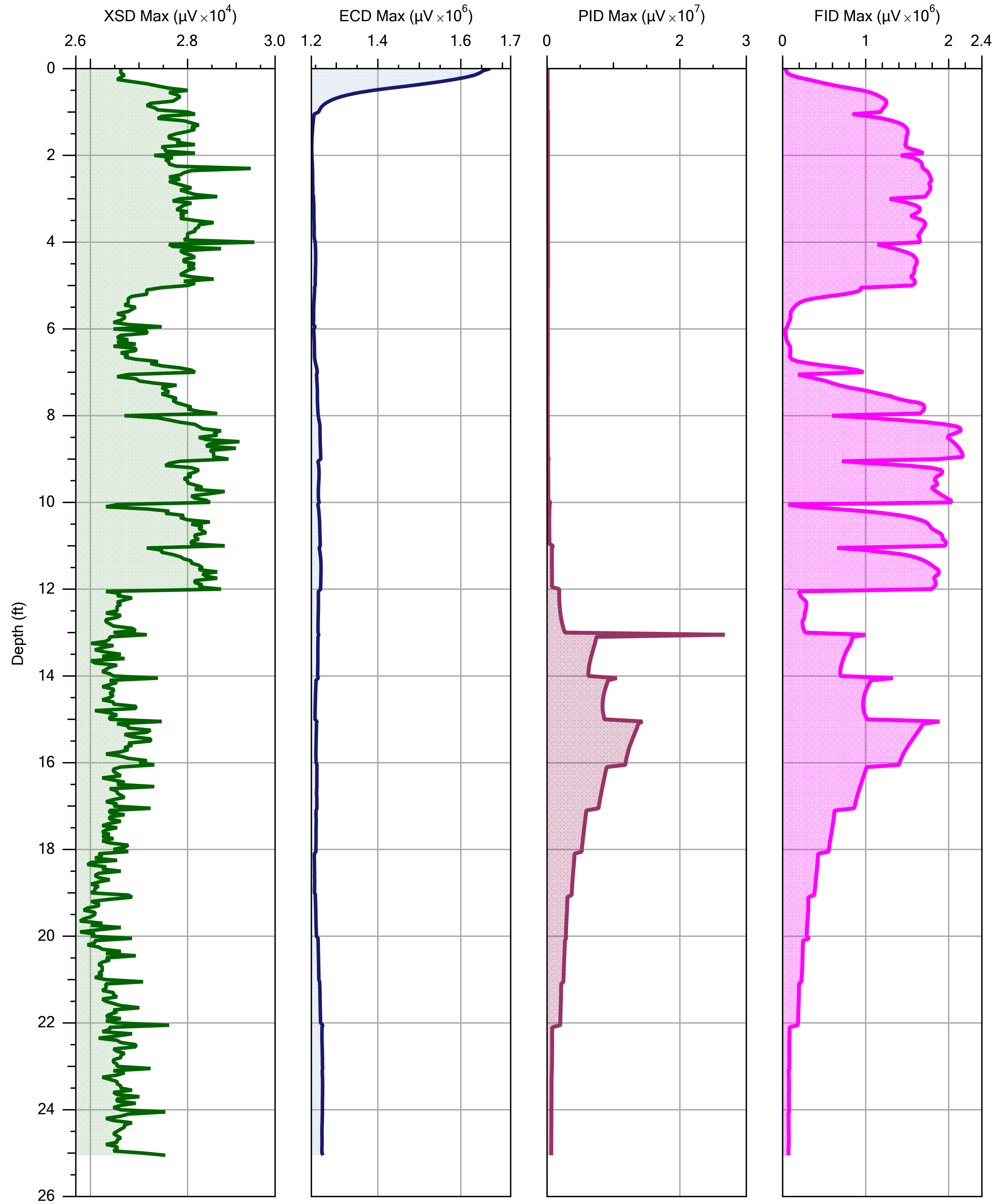
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-34.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 45″ W



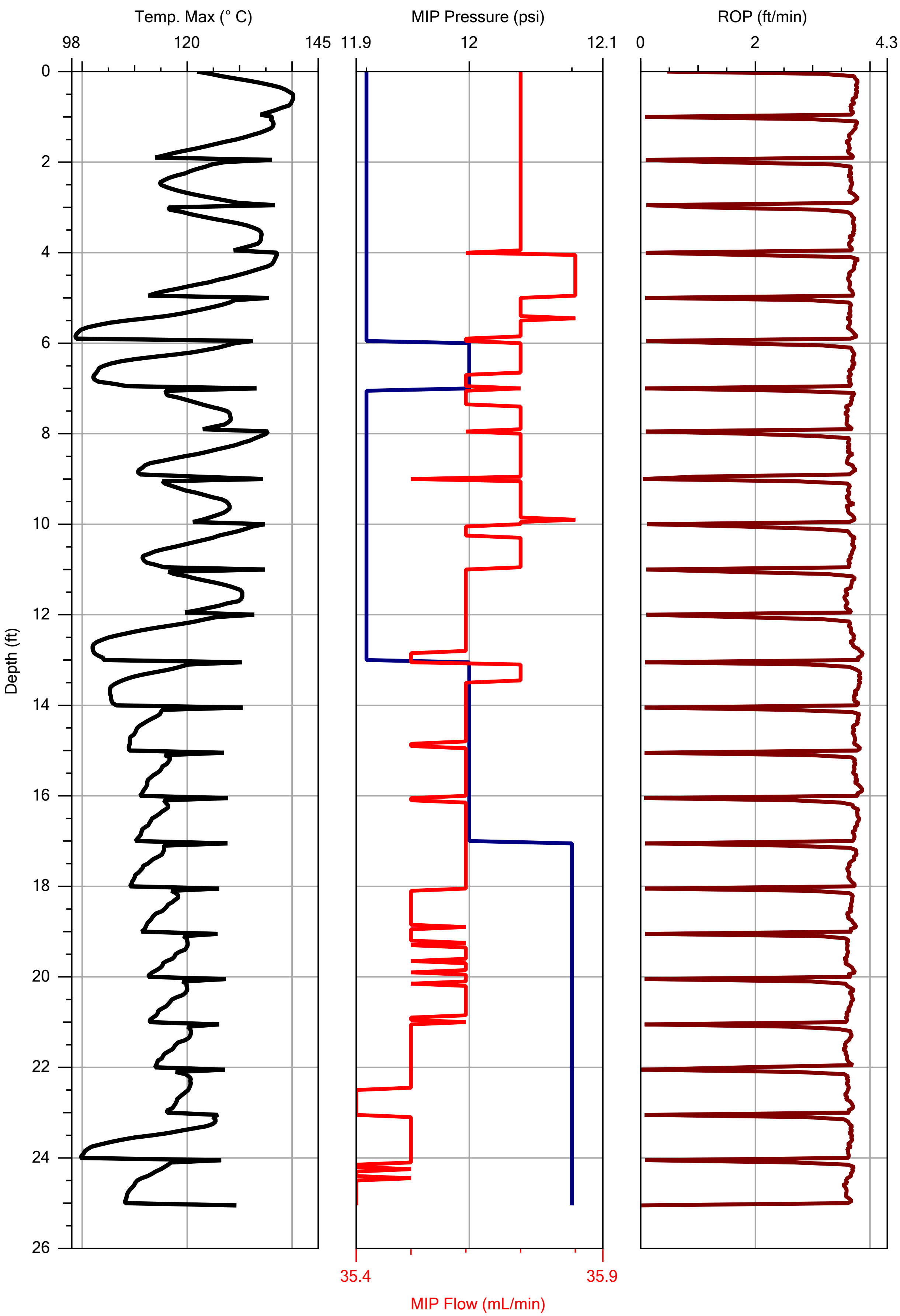
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-34.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 45″ W



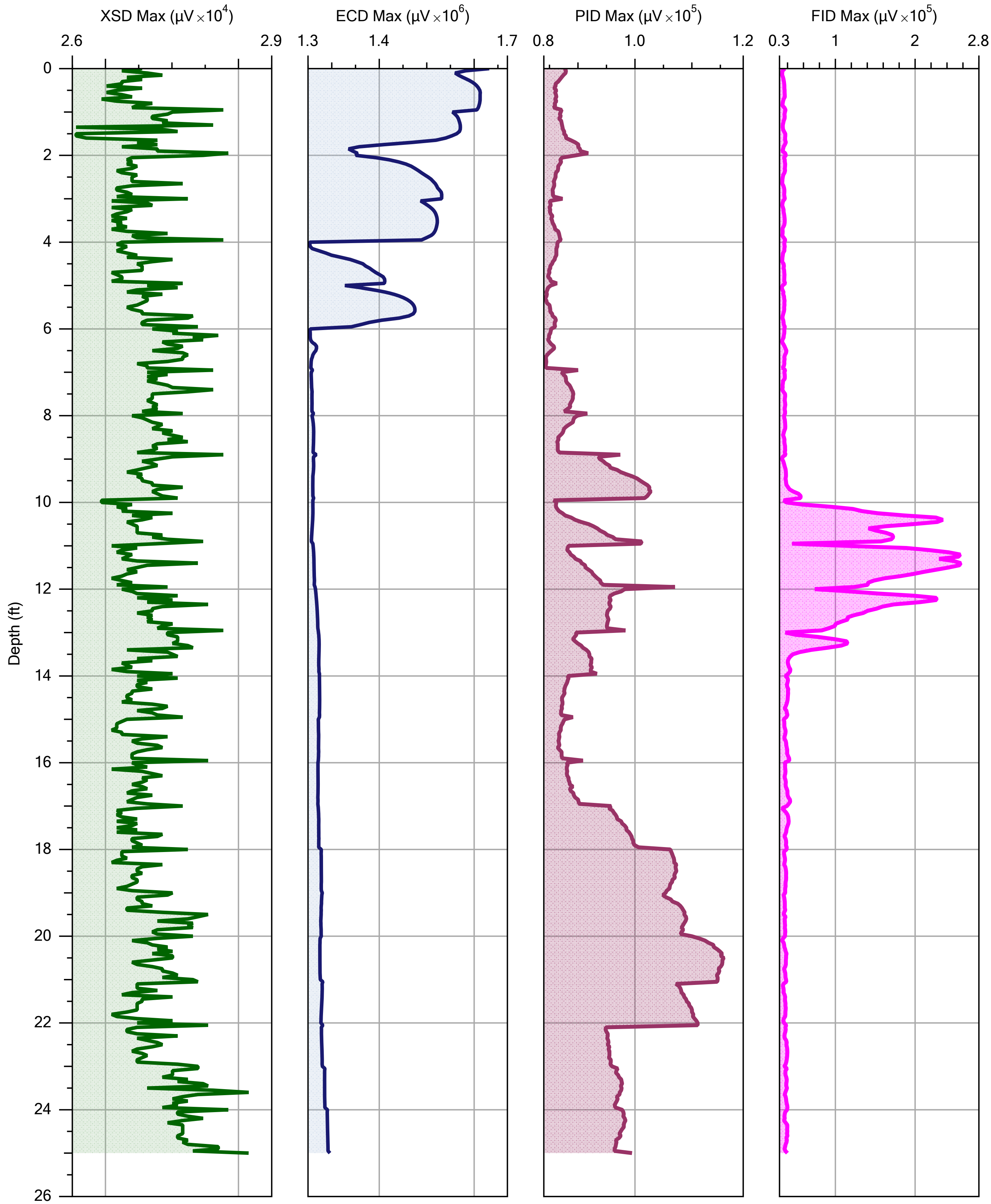
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-35.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 46″ W



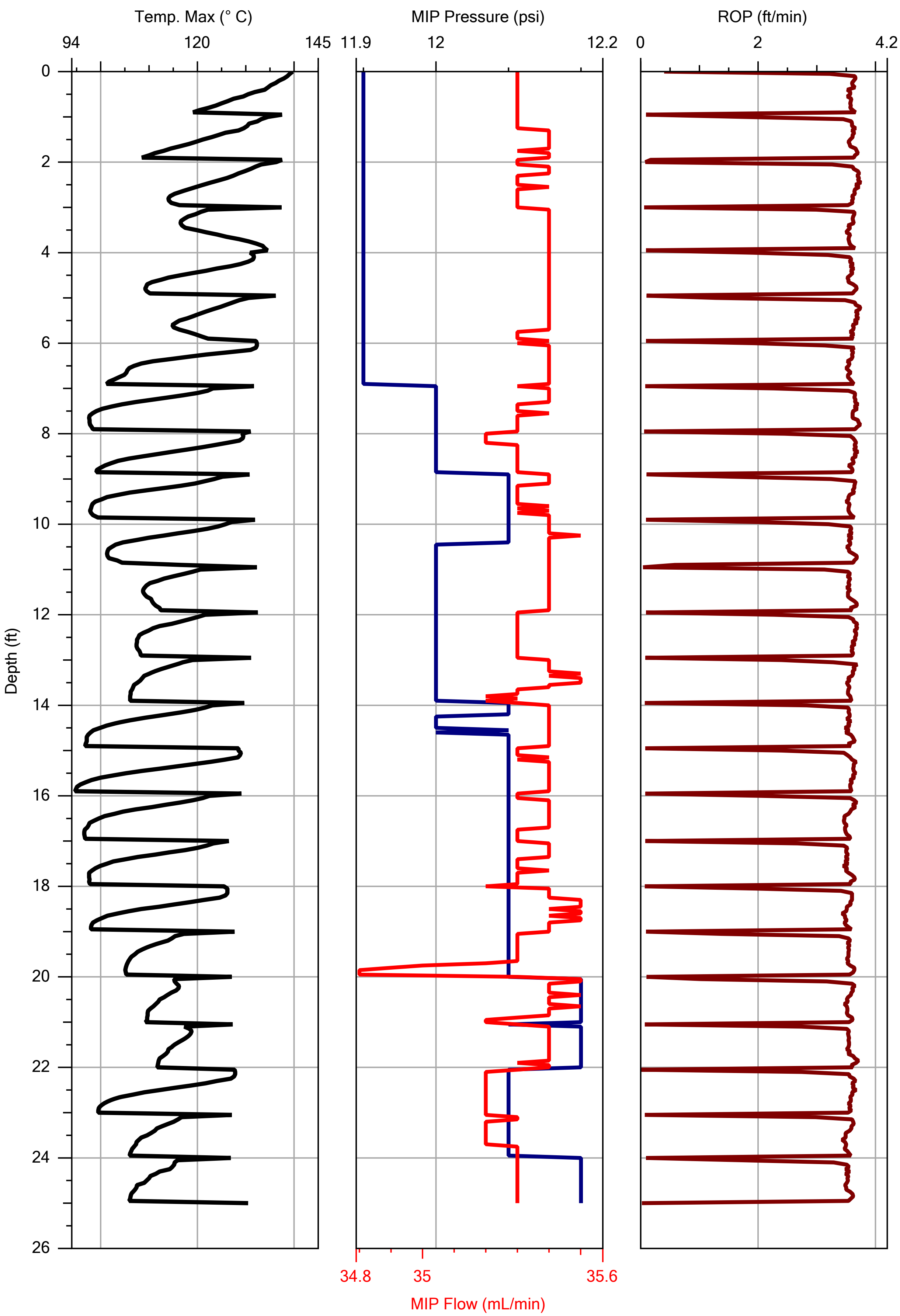
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-35.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 46″ W



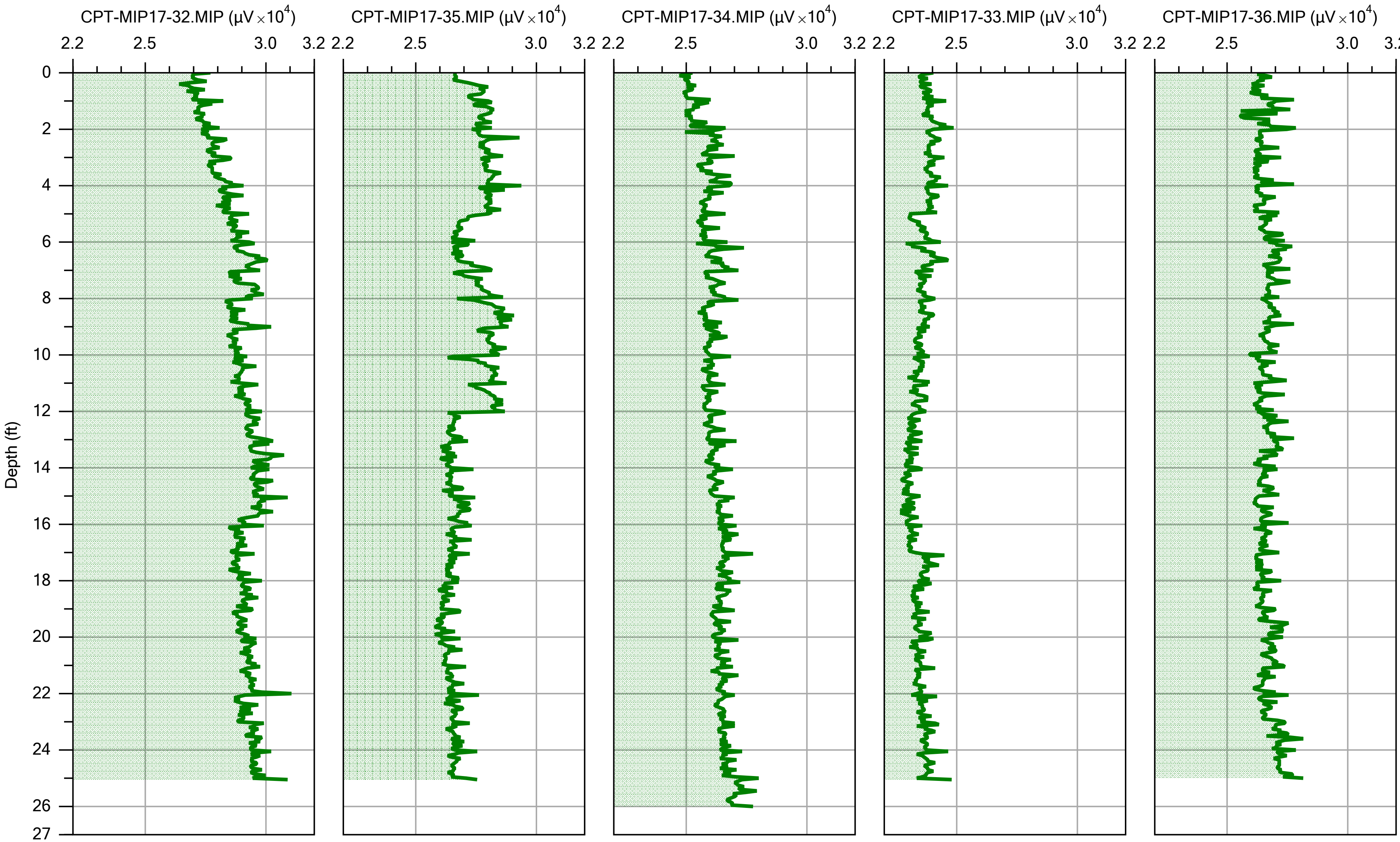
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-36.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 45″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-36.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/29/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 9″ N, 74° 57′ 45″ W



CPT-MIP17-32.MIP 9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-35.MIP 9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W

CPT-MIP17-34.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-33.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-36.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

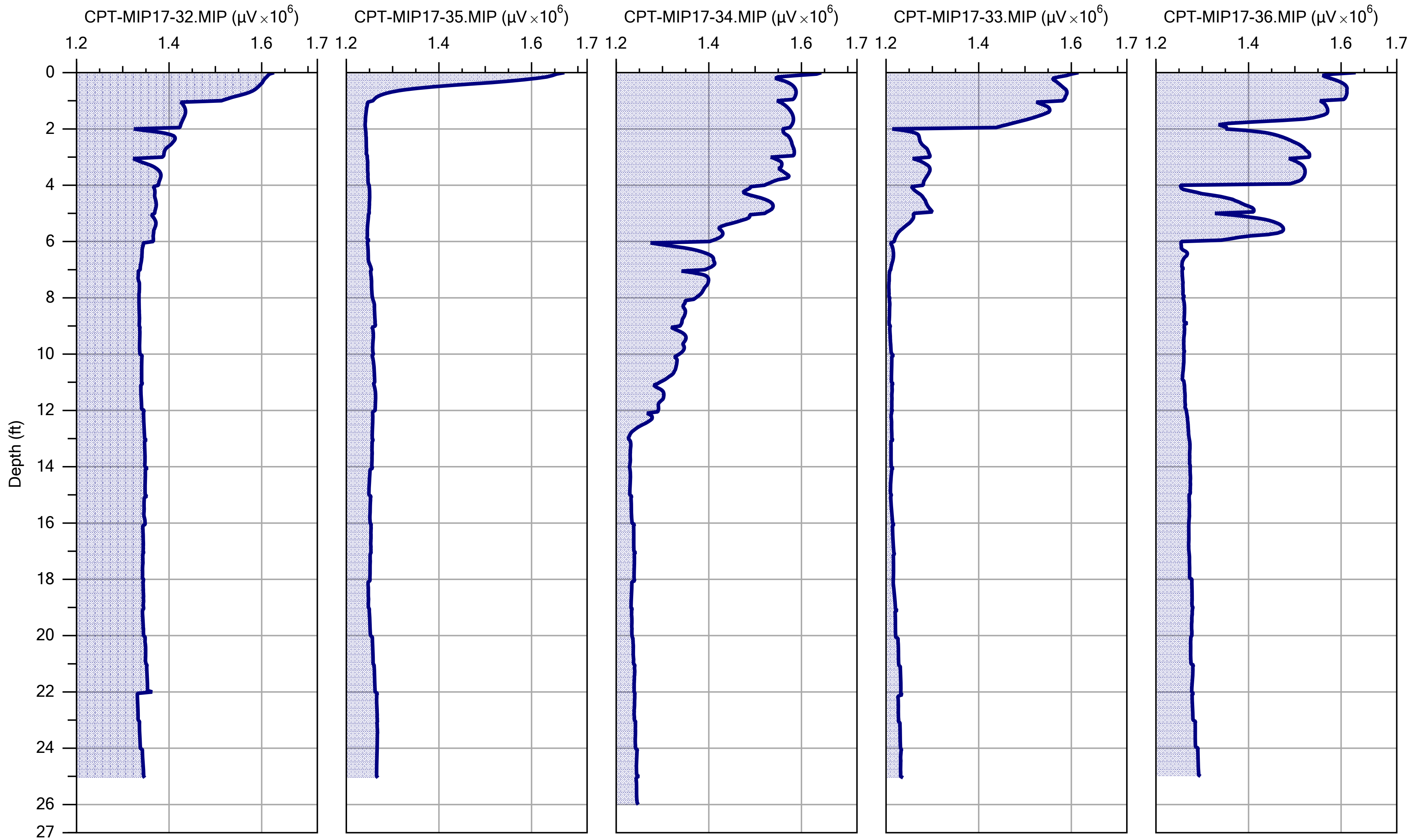
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-32.MIP 9/29/2017	34° 50′ 9″ N, 74° 57′ 45″ W
CPT-MIP17-35.MIP 9/29/2017	39° 50′ 10″ N, 74° 57′ 46″ W
CPT-MIP17-34.MIP 9/29/2017	39° 50′ 9″ N, 74° 57′ 45″ W
CPT-MIP17-33.MIP 9/29/2017	39° 50′ 9″ N, 74° 57′ 47″ W
CPT-MIP17-36.MIP 9/29/2017	39° 50′ 9″ N, 74° 57′ 45″ W

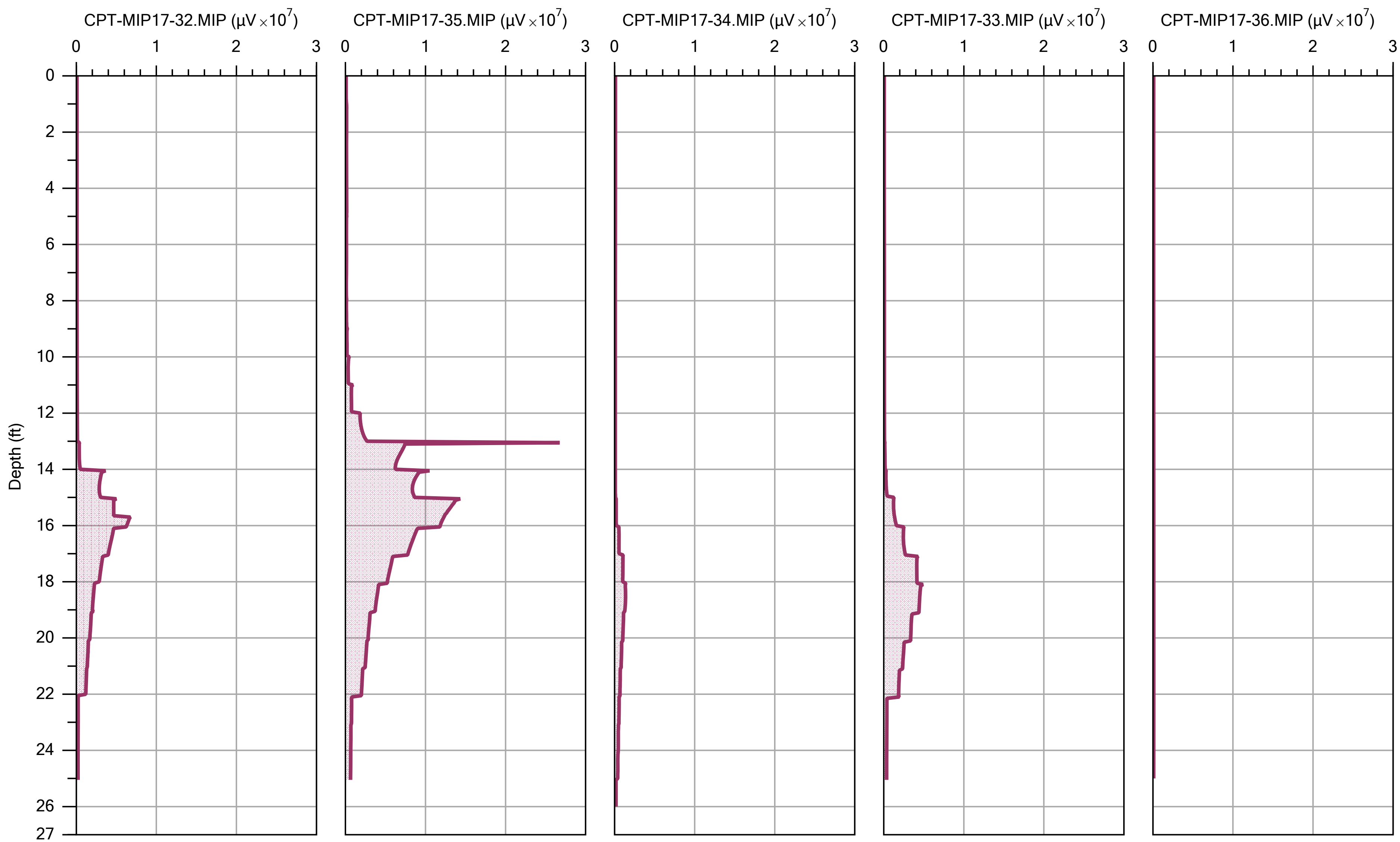
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

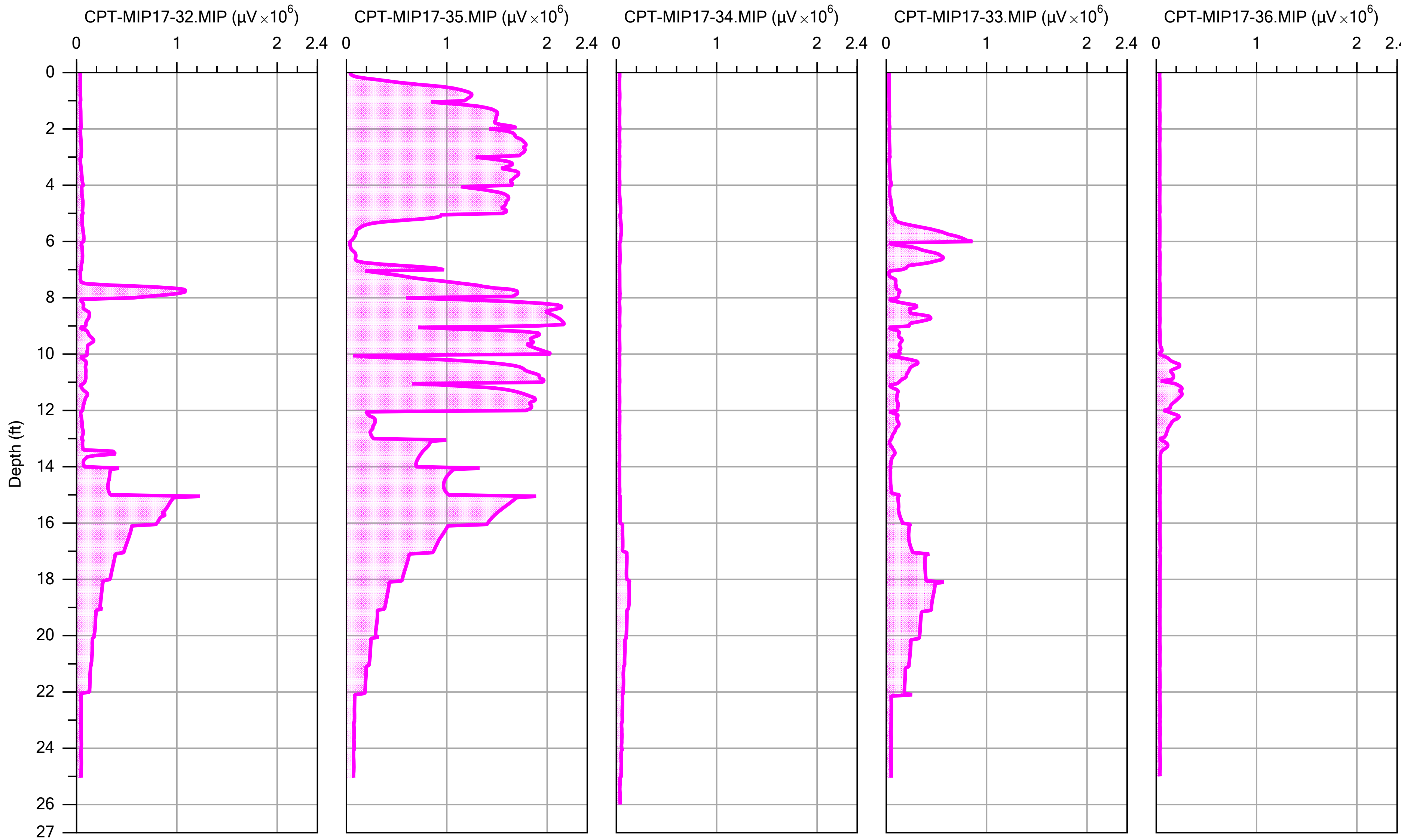
CPT-MIP17-32.MIP 9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-35.MIP 9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W

CPT-MIP17-34.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-33.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-36.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W



CPT-MIP17-32.MIP 9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-35.MIP 9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W

CPT-MIP17-34.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-33.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-36.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

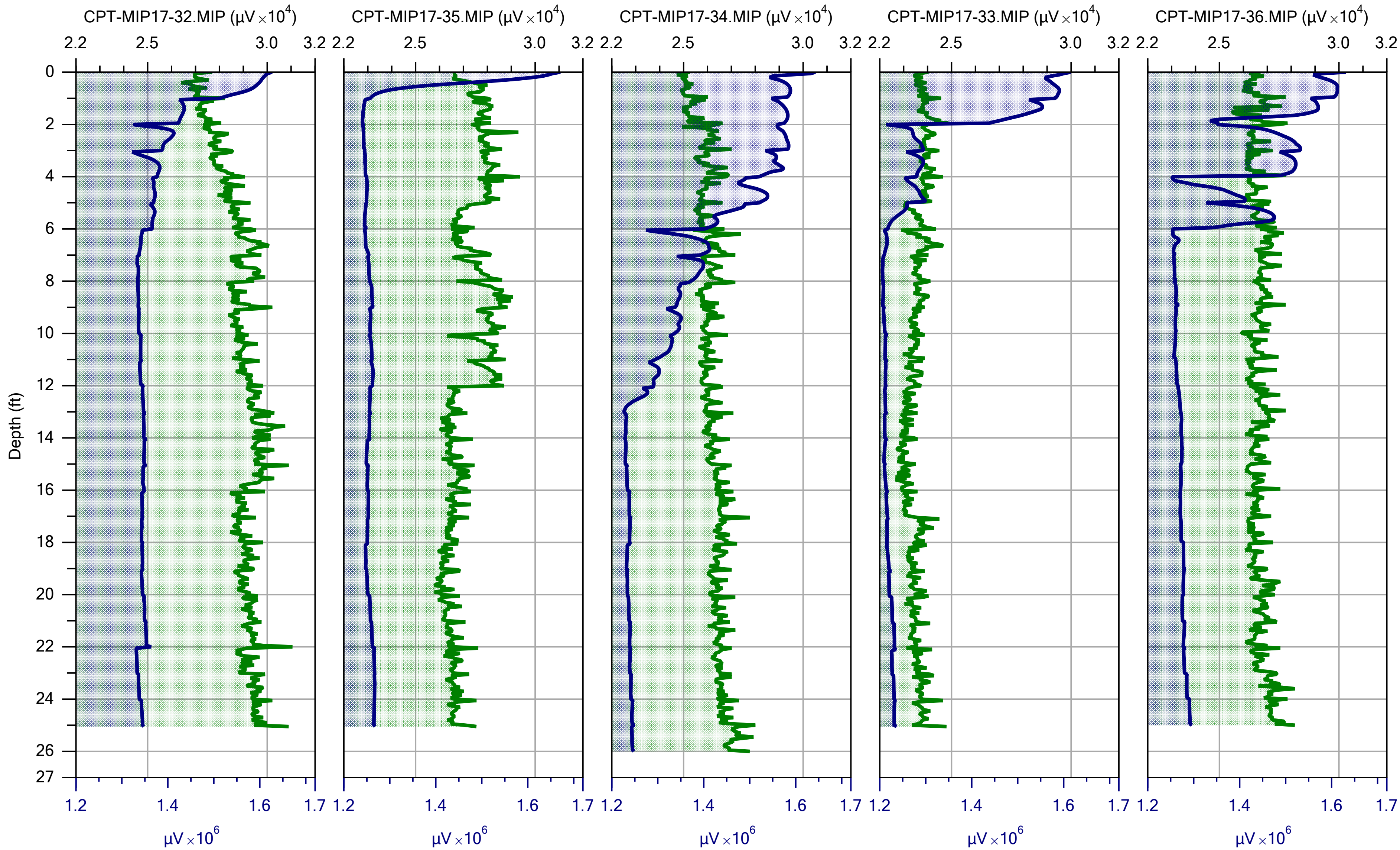
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-32.MIP 9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-35.MIP 9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W

CPT-MIP17-34.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-33.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-36.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

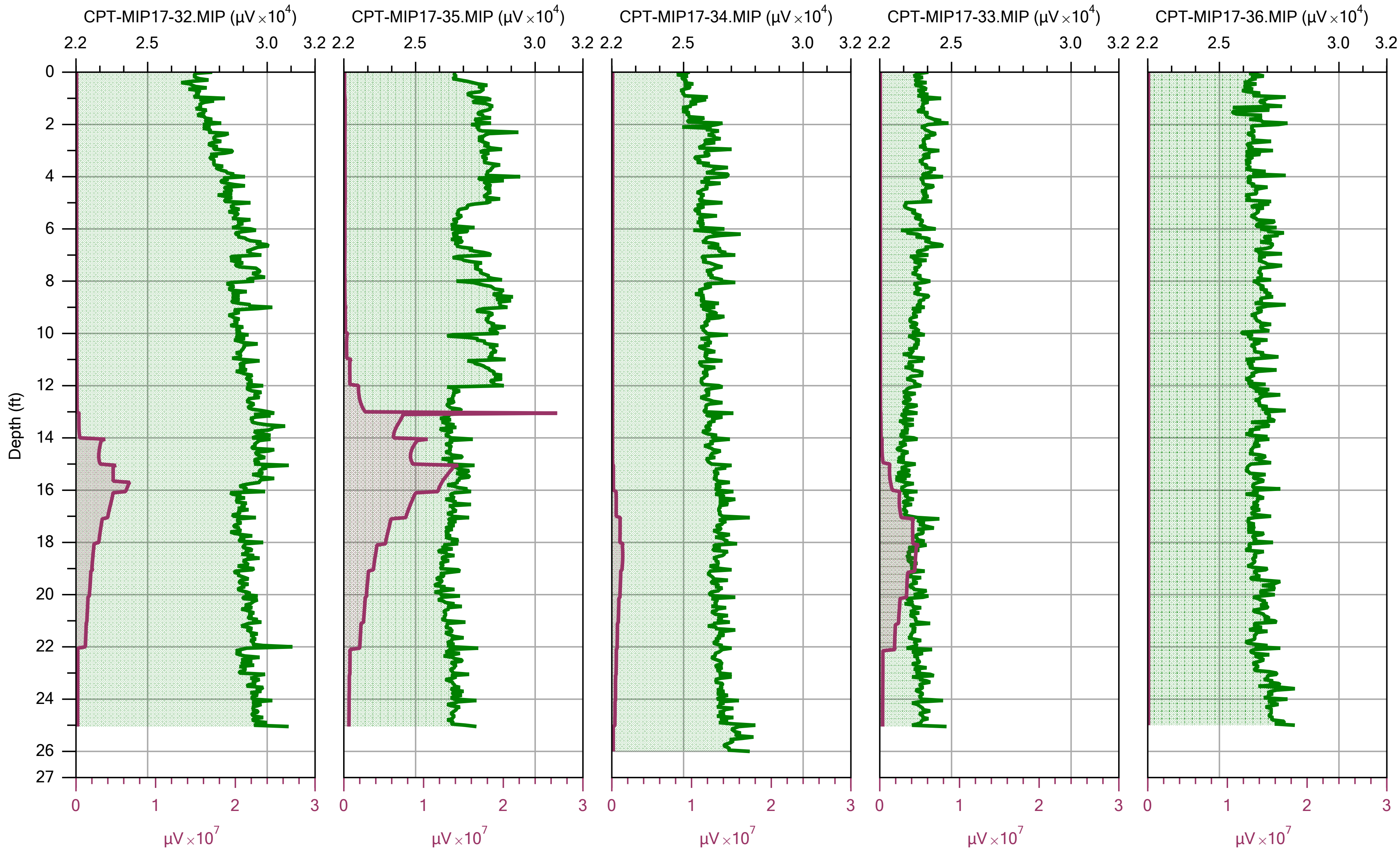
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



CPT-MIP17-32.MIP	9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W	
CPT-MIP17-35.MIP	9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W	
CPT-MIP17-34.MIP	9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W	
CPT-MIP17-33.MIP	9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W	
CPT-MIP17-36.MIP	9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W	

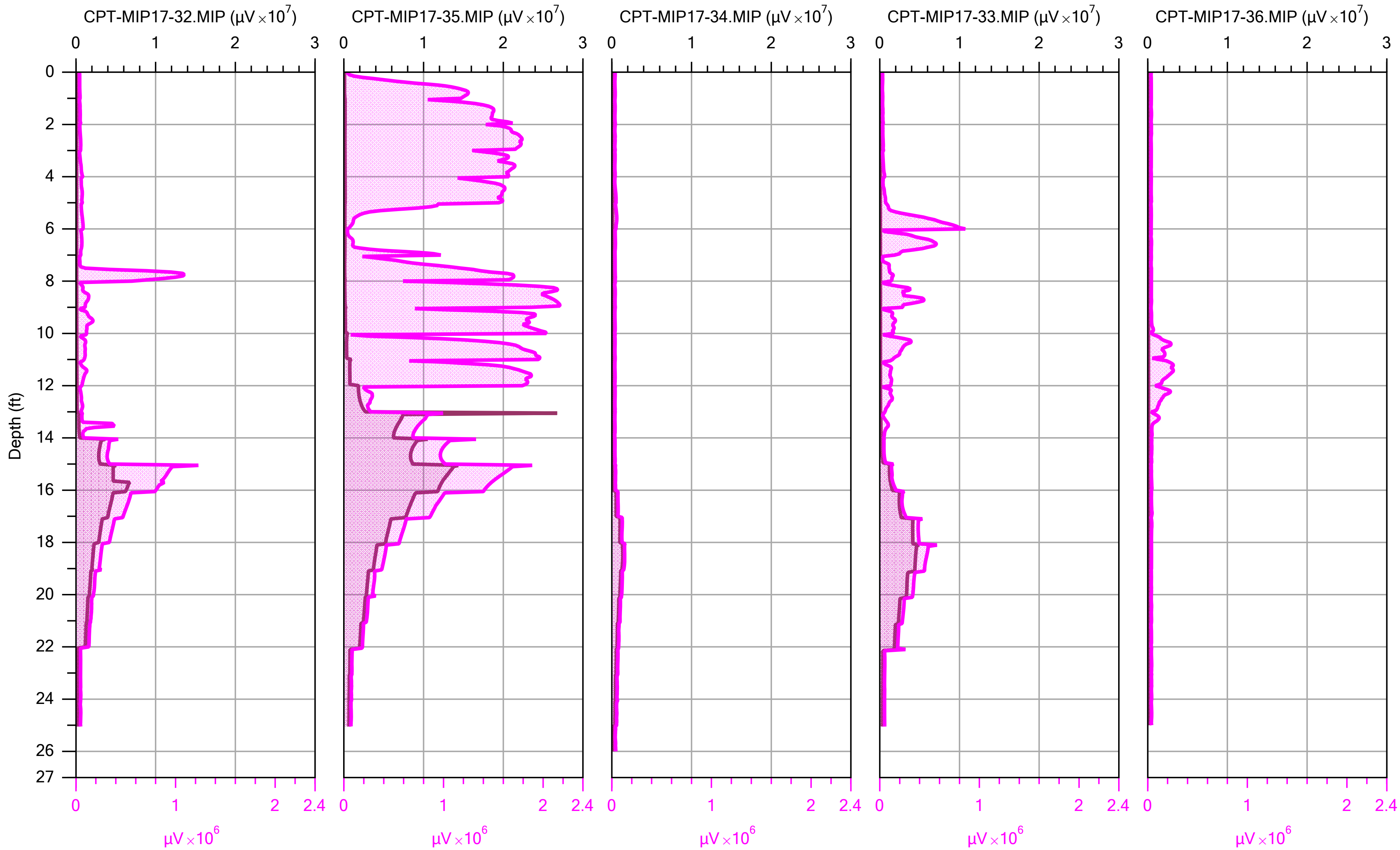
ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

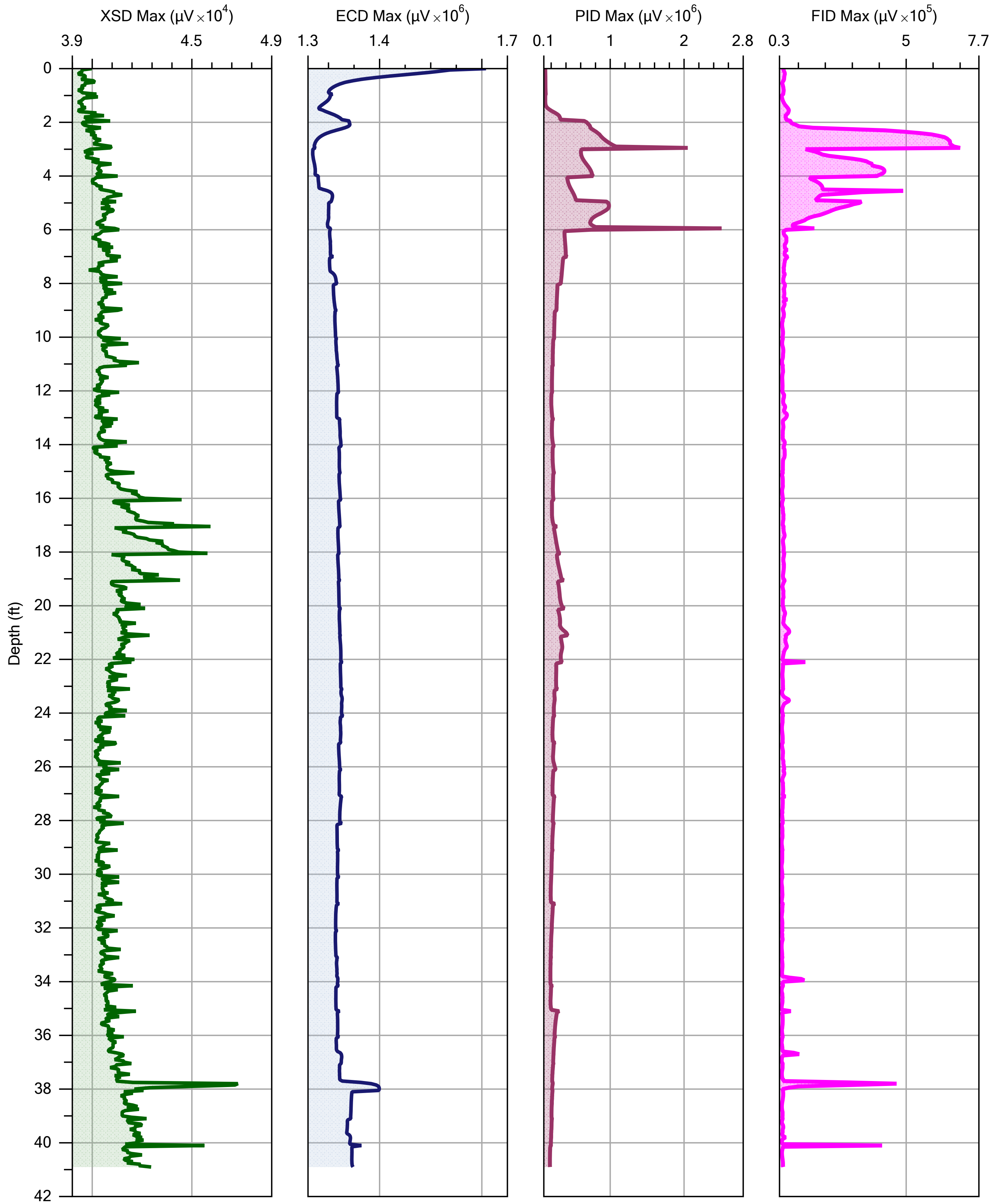
CPT-MIP17-32.MIP 9/29/2017
34° 50′ 9″ N, 74° 57′ 45″ W

CPT-MIP17-35.MIP 9/29/2017
39° 50′ 10″ N, 74° 57′ 46″ W

CPT-MIP17-34.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W

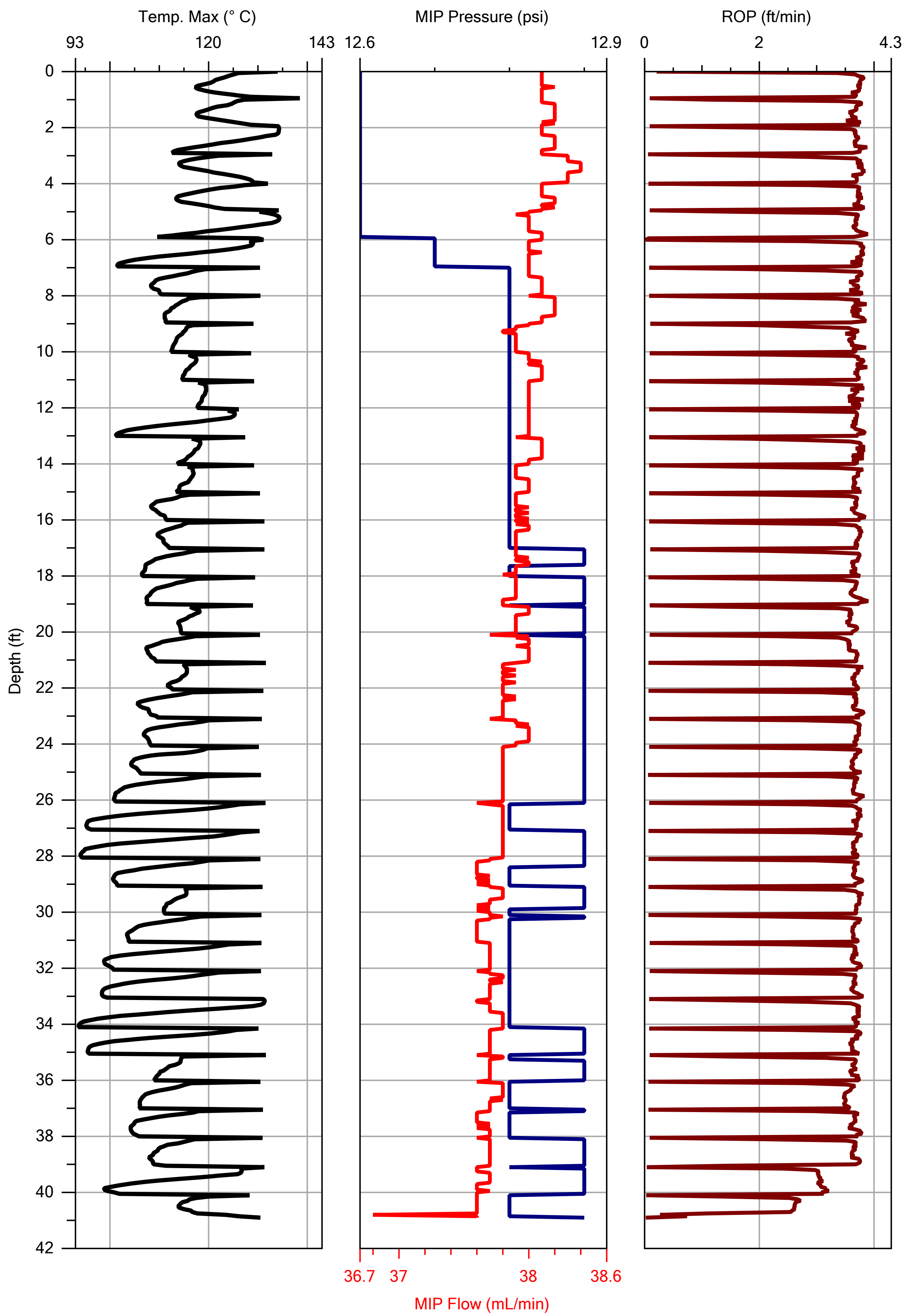
CPT-MIP17-33.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 47″ W

CPT-MIP17-36.MIP 9/29/2017
39° 50′ 9″ N, 74° 57′ 45″ W



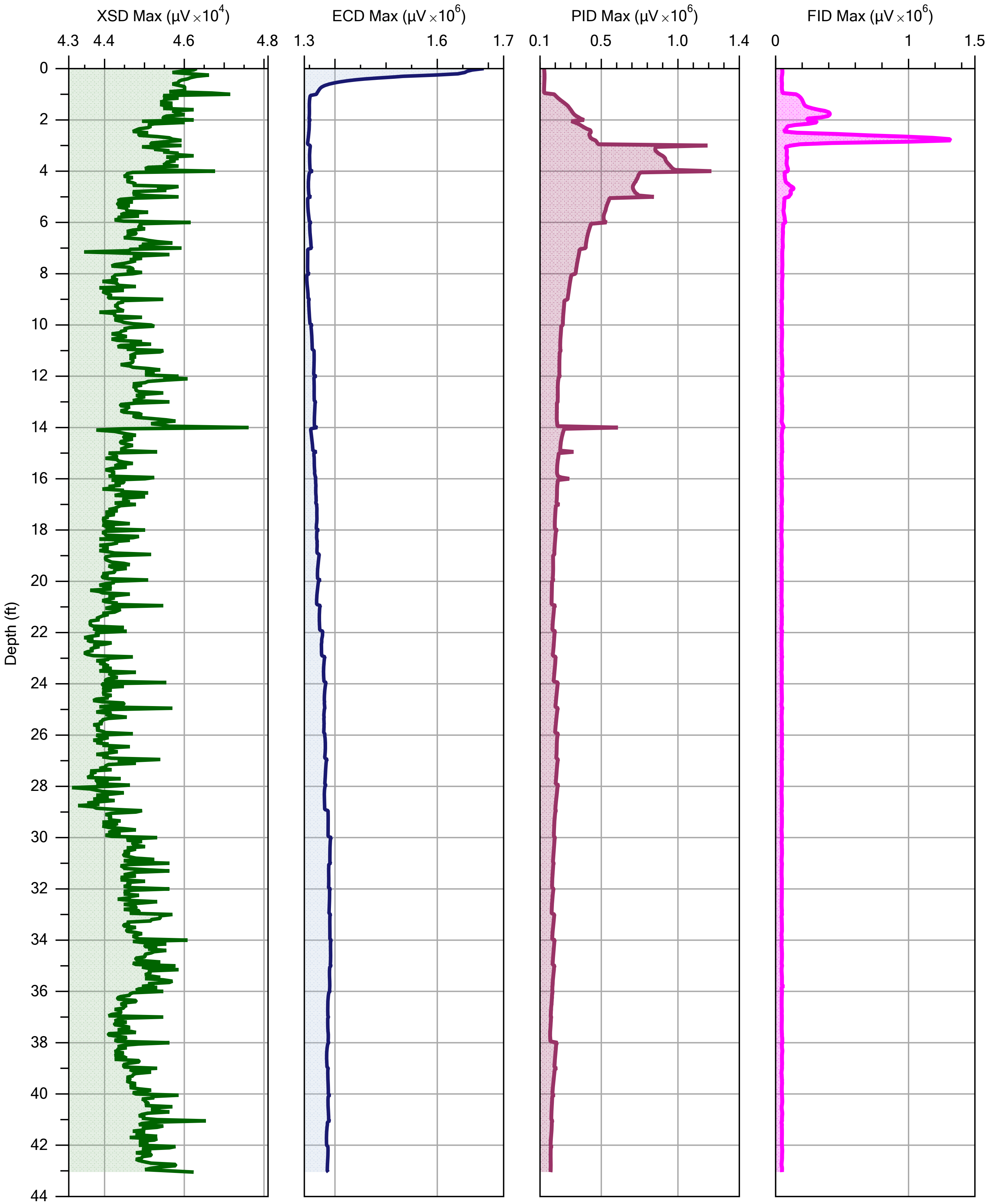
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-14.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 51″ W



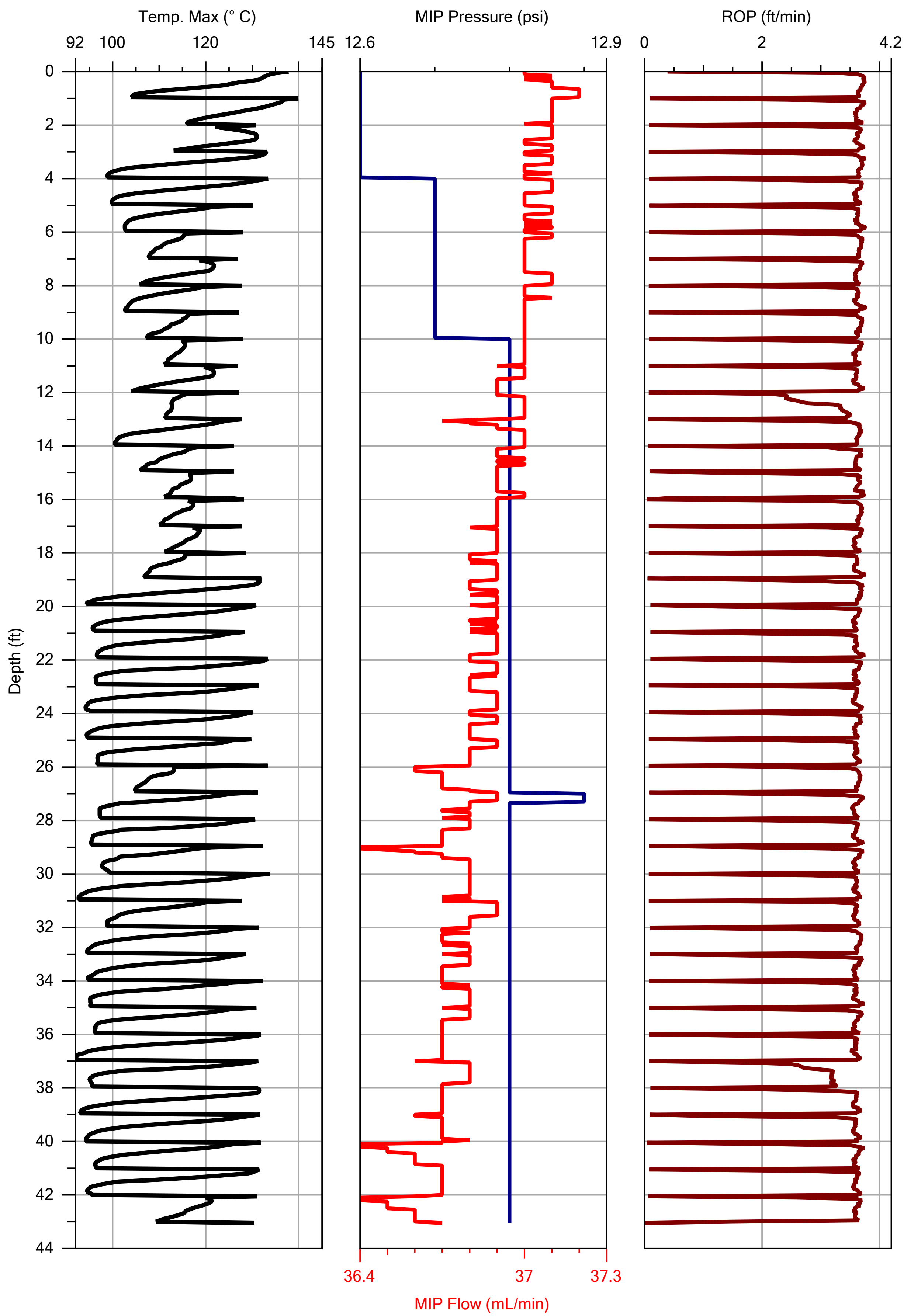
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-14.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 51″ W



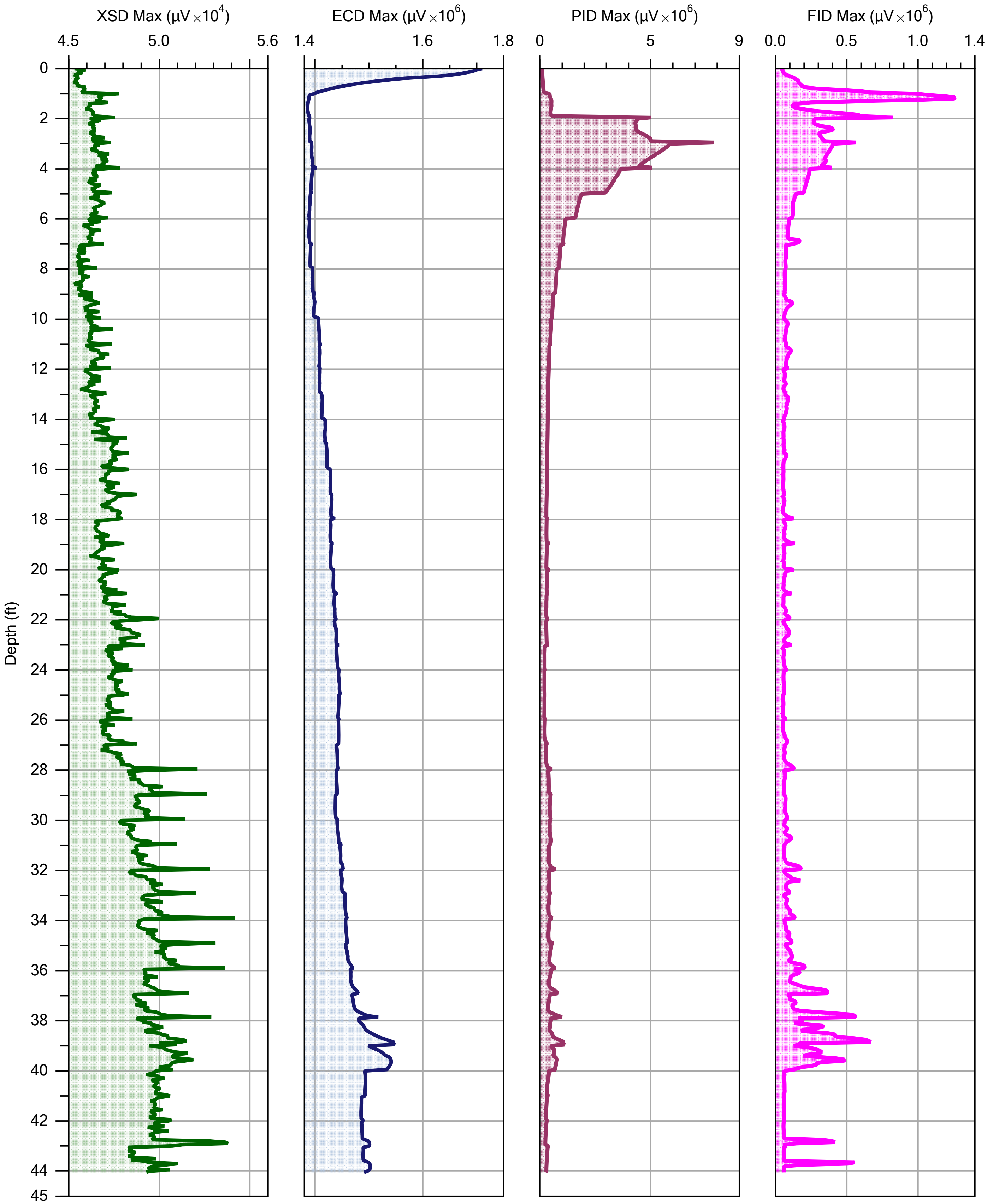
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-15.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 52″ W



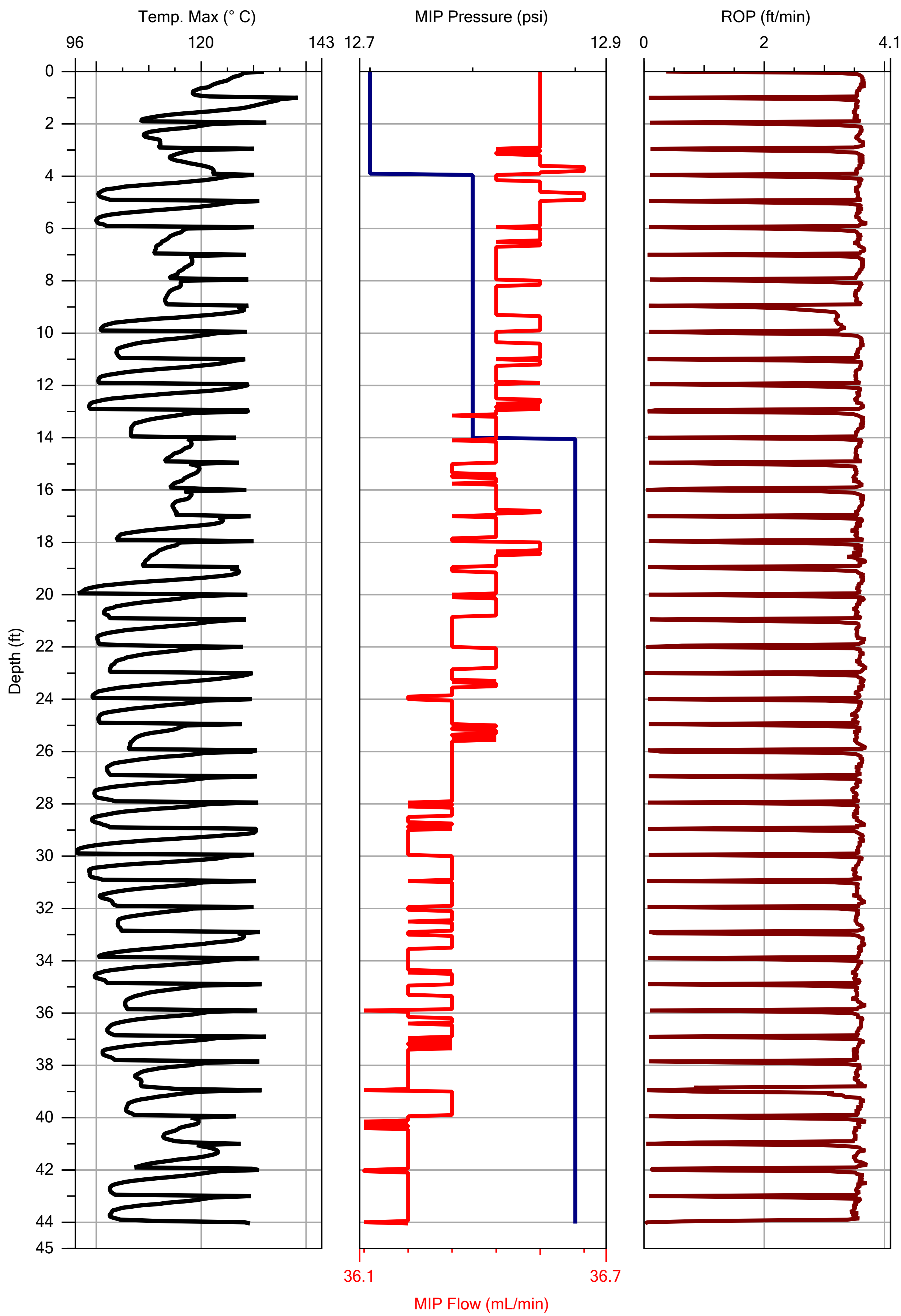
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

Company: ASC Tech Services	Operator: Jaime Ricci	File: CPT-MIP17-15.MIP Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 52″ W



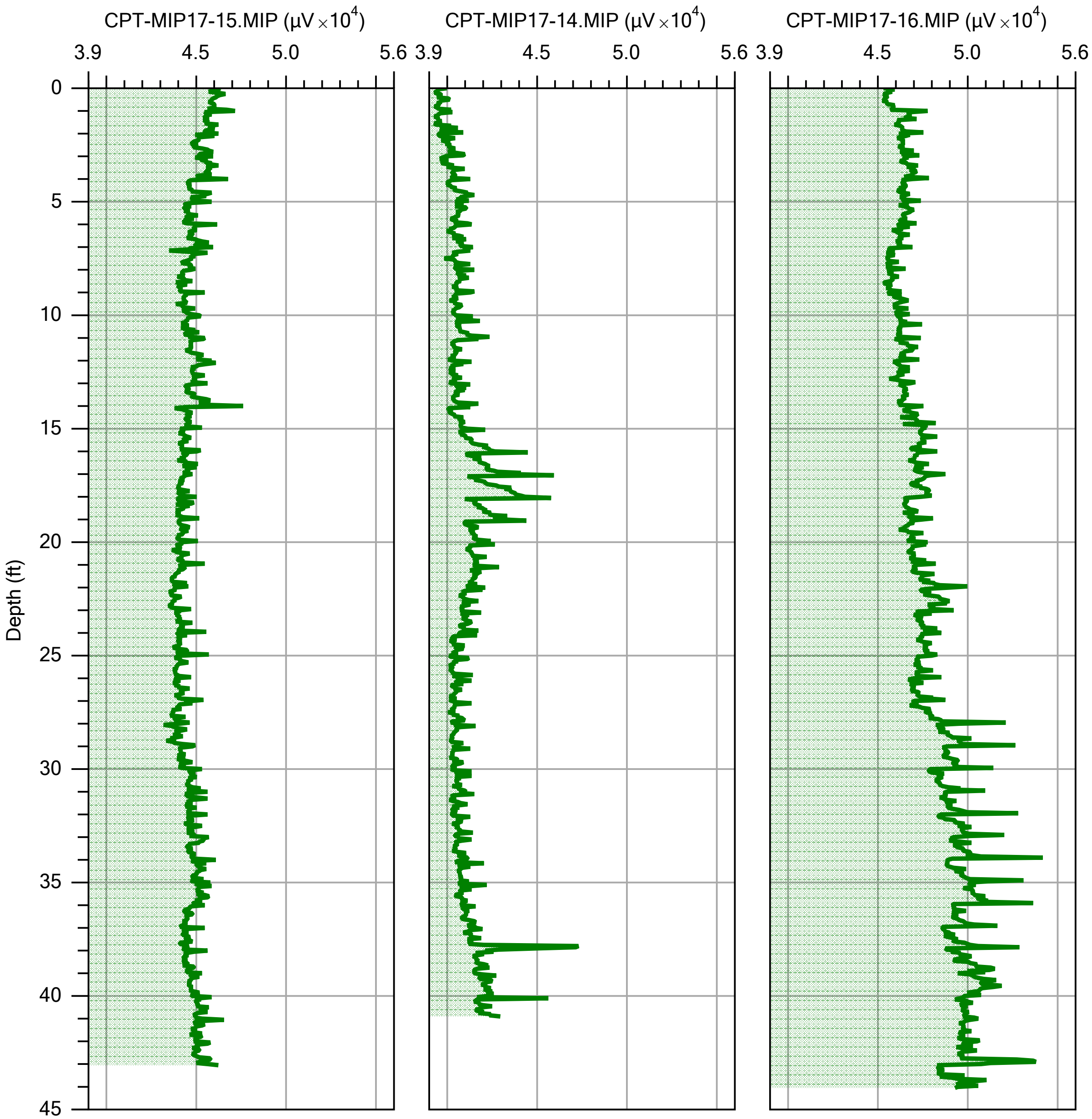
ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-16.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

		File: CPT-MIP17-16.MIP
Company: ASC Tech Services	Operator: Jaime Ricci	Date: 9/22/2017
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS	Location: 39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

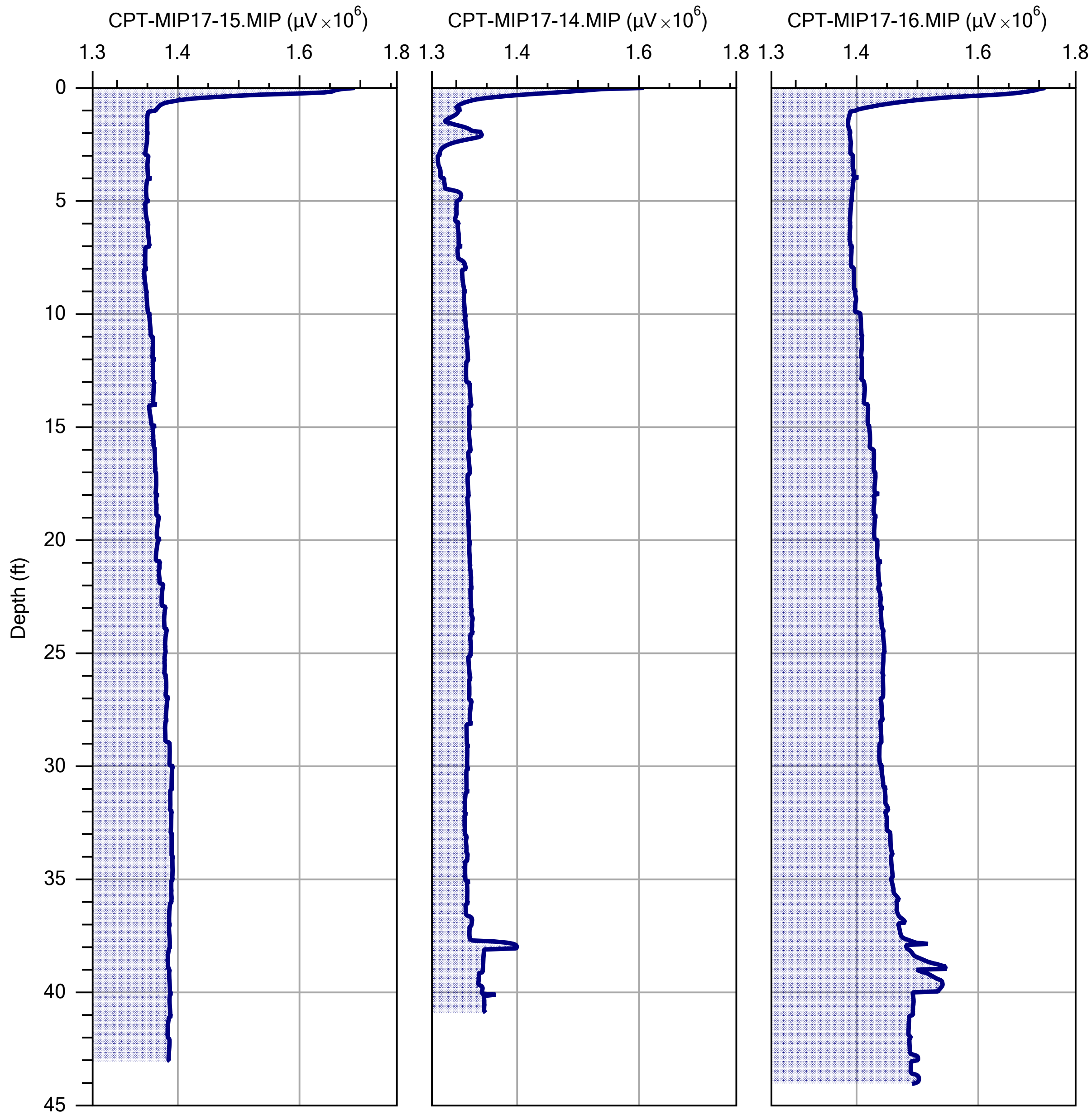
XSD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

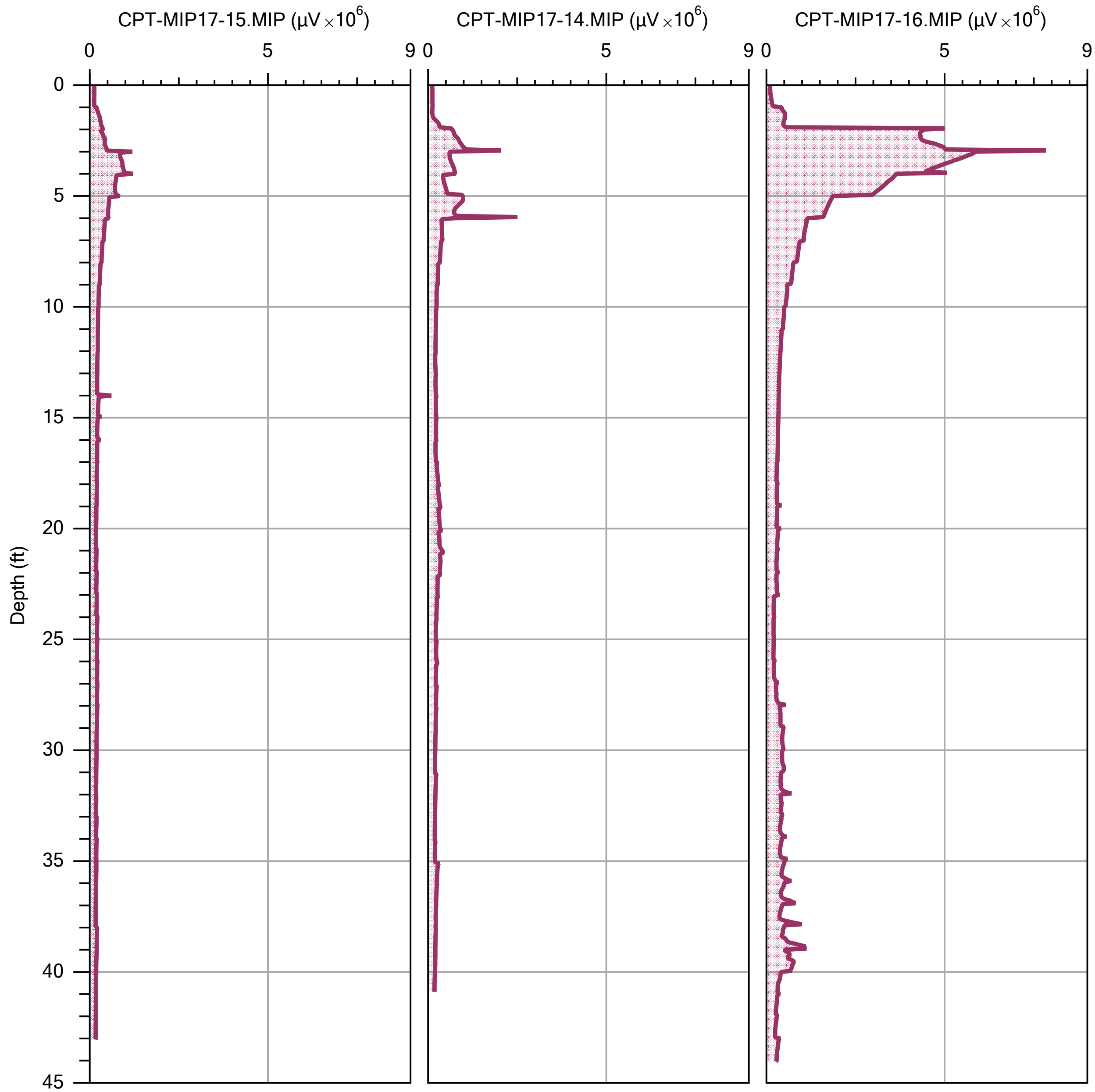
ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services
High-Resolution Site Characterization Technologies
MIP | HPT | CPT | EC | PST

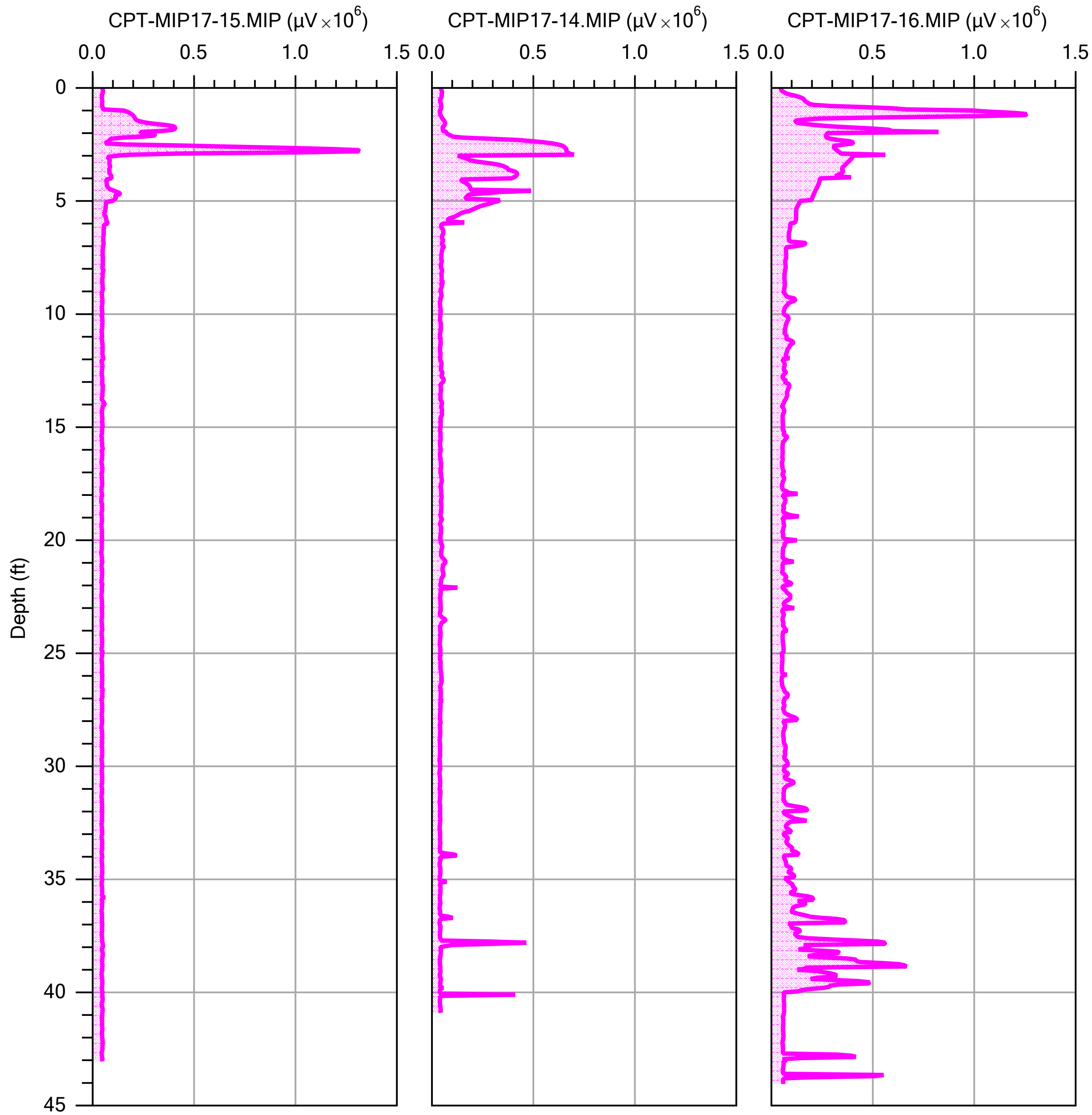
PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

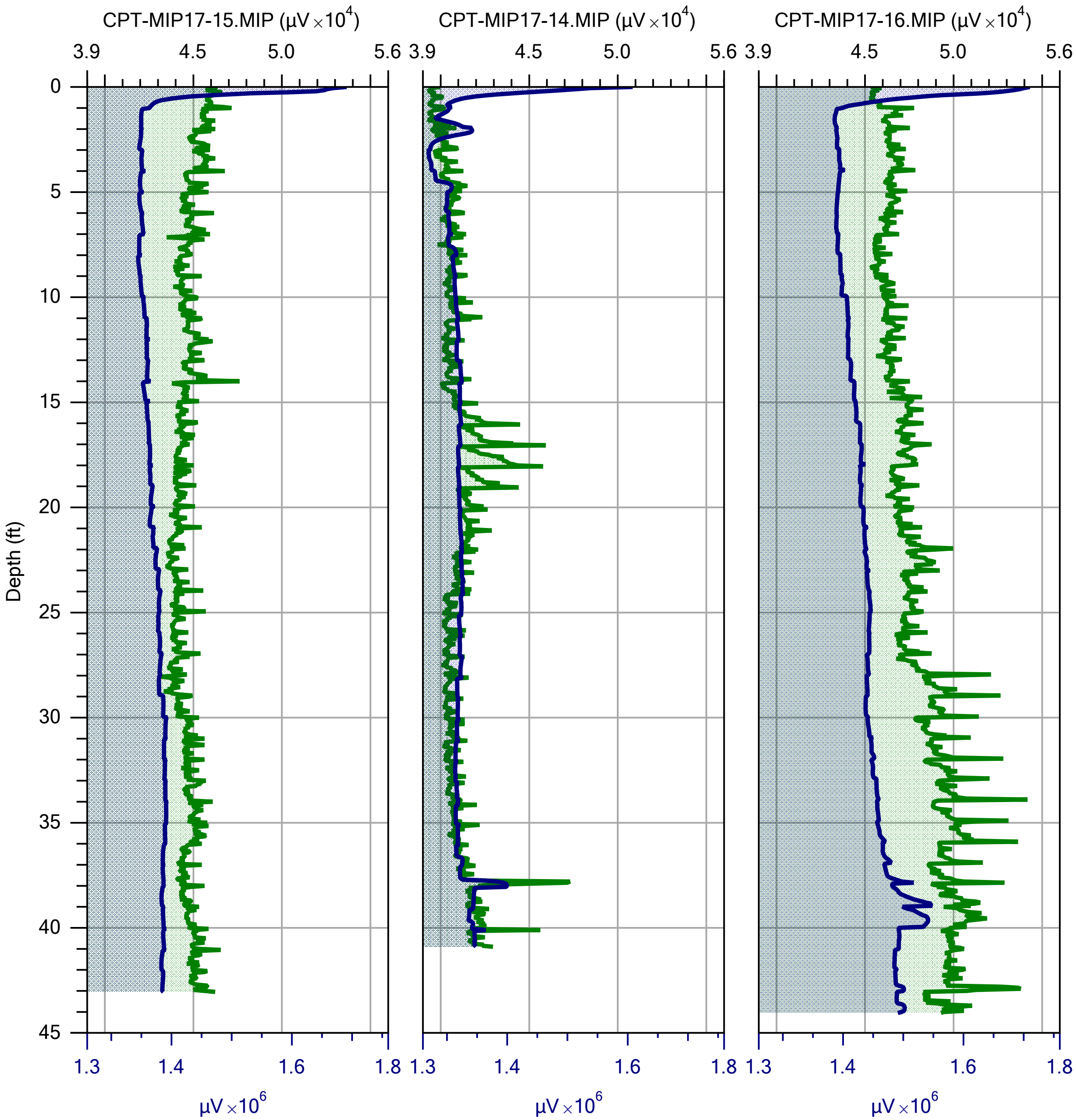
FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

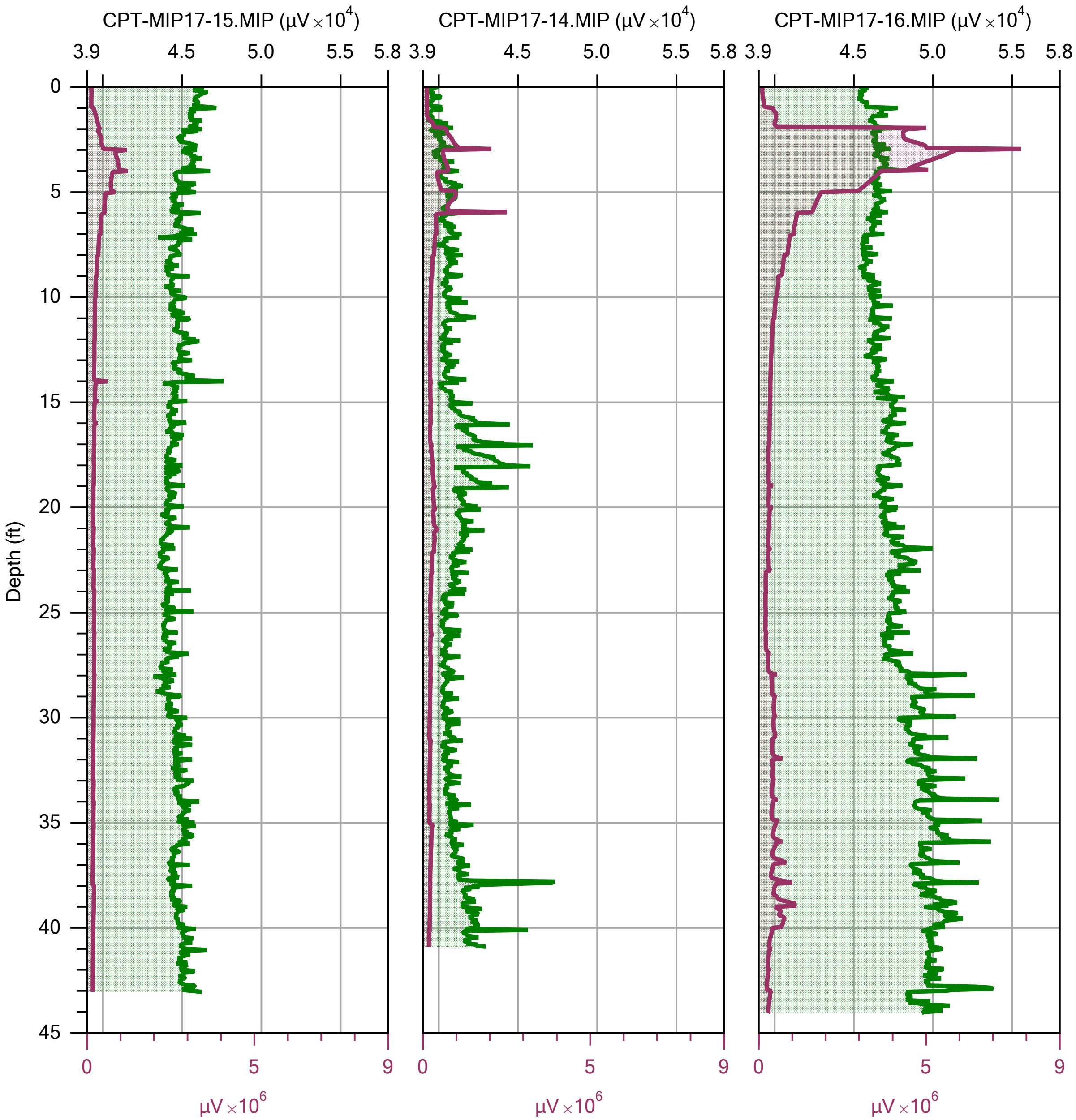
XSD Max / ECD Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

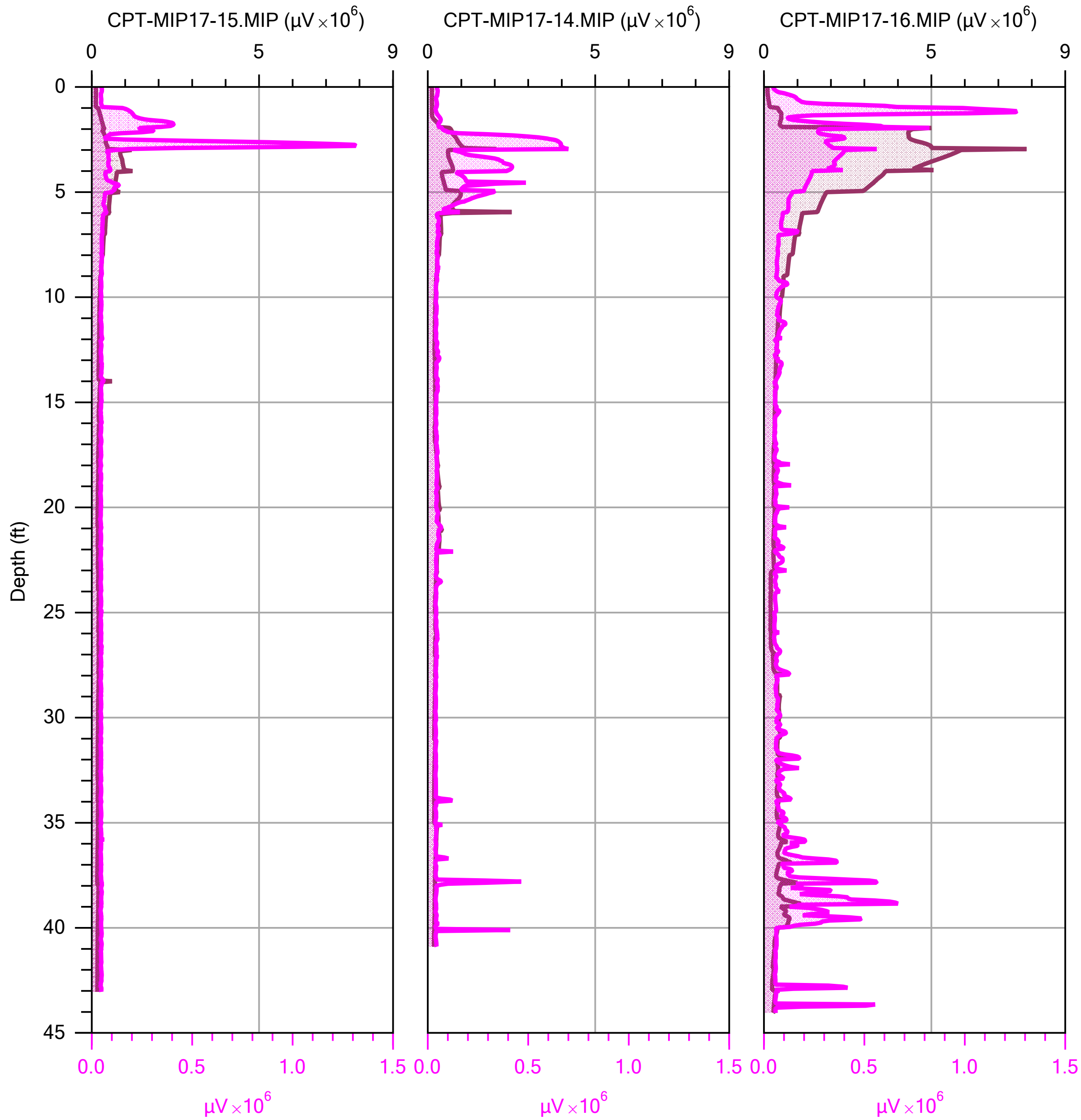
XSD Max / PID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W



ASC Tech Services

High-Resolution Site Characterization Technologies

MIP | HPT | CPT | EC | PST

PID Max / FID Max

Company: ASC Tech Services	Operator: Jaime Ricci
Project ID: Sherwin-Williams Manufacturing Plant	Client: Weston/EHS

CPT-MIP17-15.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 52″ W

CPT-MIP17-14.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 51″ W

CPT-MIP17-16.MIP 9/22/2017
39° 50′ 10″ N, 74° 57′ 50″ W

APPENDIX C SOIL SAMPLE PETROPHYSICAL LABORATORY ANALYTICAL REPORT

5730 Centralcrest St. • Houston, TX 77092
Telephone (713) 316-1800 • Fax (877) 225-9953

January 9, 2018

Michelle Stayrook
Project Manager
EHS Support LLC
27822 Camino Santo Domingo
San Juan Capistrano, CA 92675

Re: PTS File No: 47478
Project Name: Sherwin-Williams Gibbsboro, NJ
Project Number: C05552-2017-200

Dear Ms. Stayrook,

Please find enclosed report for Physical Properties analyses conducted upon samples received from your Gibbsboro, NJ project.
These results are for Pore Fluid Saturations, Effective Drainage Porosity, and Grain Size Analysis. The Imbibition Capillary Pressure test is still in progress and will be reported separately.
All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past the completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact myself or Emeka Anazodo at (713) 316-1800.

Sincerely,
PTS Laboratories, Inc.

Rick Schweizer

Rick Schweizer
Laboratory Supervisor

Encl.

PTS Laboratories

Project Name: Sherwin-Williams Gibbsboro, NJ | **PTS File No:** 47478
Project Number: C05552_2017-200 | **Client:** EHS Support

TEST PROGRAM - 20171116

CORE ID	Depth ft.	PTS Sample ID #	Grain Size Analysis ASTM D4464M	Pore Fluid Saturation Package	A/W Imbib. Capillary Curve	Effective Porosity Mod. ASTM D425		Comments
		Plugs:	Grab	Hor. 1.5"	Hor. 1"	Vert. 1.5"		
Date Received: 20171114								
DP-1	15.3-16.0	1	X	X				
DP-2	12.0-12.6	2	X	X				
DP-4	13.5-14.2	3	X		X	X		
DP-5	11.5-12.2	4	X	X				
DP-8	12.0-12.7	5	X	X				
DP-9	8.0-8.8	6	X		X	X		
DP-13	2.2-3.0	7	X		X	X		
DP-13	6.5-7.2	8	X	X				
DP-14	6.8-7.5	9	X		X	X		
DP-14	13.5-14.2	10	X	X				
DP-15	6.8-7.4	11	X		X	X		
DP-15	11.0-11.7	12	X	X				
DP-16	3.3-4.0	13	X	X				
DP-17	1.9-2.5	14	X	X				
DP-17	3.0-3.6	15	X		X	X		
DP-17	4.4-5.0	16	X	X				
DP-18	3.5-4.2	17	X		X	X		
DP-18	6.5-7.2	18	X	X				
DP-20	6.2-6.8	19	X		X	X		
DP-20	8.0-8.8	20	X	X				
DP-21	10.7-11.2	21	X	X				
DP-21	11.2-11.7	22	X		X	X		
DP-21	14.0-14.6	23	X	X				
DP-21	16.9-17.3	24	X	X				
DP-22	7.3-8.0	25	X	X				
DP-22	11.3-12.0	26	X	X				
DP-22	13.5-14.2	27	X		X	X		
DP-22	17.7-18.3	28	X	X				
DP-22	20.5-21.0	29	X	X				
DP-23	11.0-11.7	30	X	X				
DP-23	14.0-14.7	31	X		X	X		
DP-23	16.0-16.7	32	X	X				
DP-24	13.5-14.2	33	X		X	X		
DP-24	17.0-17.5	34	X	X				
TOTALS:	**34 cores**	**0.00**	**34**	**22**	**12**	**12**	**0**	**34**

Laboratory Test Program Notes

PTS Laboratories, Inc.

EHS Support
PTS File No: 47478

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Sherwin-Williams Gibbsboro, NJ

PROJECT NO: C05552_2017-200

Report Date: 9-Jan-18

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
DP-1 (15.3'-16.0')	15.3-15.5	Fine sand	0.120	0.00	0.00	0.28	80.94	11.87	6.91	18.78
DP-2 (12.0'-12.6')	12.0-12.2	Fine sand	0.126	0.00	0.00	0.73	81.55	11.58	6.14	17.72
DP-4 (13.5'-14.2')	13.5-13.7	Fine sand	0.115	0.00	0.00	1.10	76.24	15.42	7.24	22.66
DP-5 (11.5'-12.2')	11.5-11.7	Fine sand	0.104	0.00	0.00	0.84	75.70	16.36	7.10	23.46
DP-8 (12.0'-12.7')	12.0-12.2	Fine sand	0.111	0.00	0.00	0.70	76.07	17.21	6.03	23.24
DP-9 (8.0'-8.8')	8.6-8.8	Fine sand	0.114	0.00	0.00	0.97	70.30	18.05	10.69	28.74
DP-13 (2.2'-3.0')	2.2-2.4	Fine sand	0.111	0.00	0.00	3.49	69.38	22.53	4.60	27.13
DP-13 (6.5'-7.2')	6.5-6.7	Fine sand	0.093	0.00	0.00	0.00	70.99	22.48	6.53	29.01
DP-14 (6.8'-7.5')	6.8-7.0	Fine sand	0.118	0.00	0.00	0.00	82.02	12.43	5.55	17.98
DP-14 (13.5'-14.2')	13.5-13.7	Fine sand	0.094	0.00	0.00	0.00	73.63	19.99	6.38	26.37
DP-15 (6.8'-7.4')	6.8-7.0	Fine sand	0.118	0.00	0.00	0.81	77.25	14.98	6.96	21.93
DP-15 (11.0'-11.7')	11.0-11.2	Fine sand	0.124	0.00	0.00	0.00	79.55	12.92	7.53	20.45
DP-17 (4.4'-5.0')	4.4-4.6	Silt	0.080	0.00	0.00	0.00	56.20	30.23	13.58	43.80
DP-18 (3.5'-4.2')	4.0-4.2	Fine sand	0.102	0.00	0.00	0.00	74.34	16.57	9.09	25.66
DP-18 (6.5'-7.2')	6.5-6.7	Fine sand	0.087	0.00	0.00	0.00	62.51	27.25	10.24	37.49
DP-20 (6.2'-6.8')	6.6-6.8	Fine sand	0.109	0.00	0.00	0.53	75.42	17.11	6.94	24.05
DP-20 (8.0'-8.8')	8.0-8.2	Fine sand	0.113	0.00	0.00	0.00	78.38	14.80	6.83	21.62
DP-21 (10.7'-11.2')	10.7-10.9	Fine sand	0.106	0.00	0.00	3.47	70.62	18.95	6.96	25.91
DP-21 (11.2'-11.7')	11.2-11.4	Fine sand	0.097	0.00	0.00	0.64	63.64	25.48	10.25	35.72

(1) Based on Mean from Trask

PTS Laboratories, Inc.

EHS Support
PTS File No: 47478

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: Sherwin-Williams Gibbsboro, NJ

PROJECT NO: C05552_2017-200

Report Date: 9-Jan-18

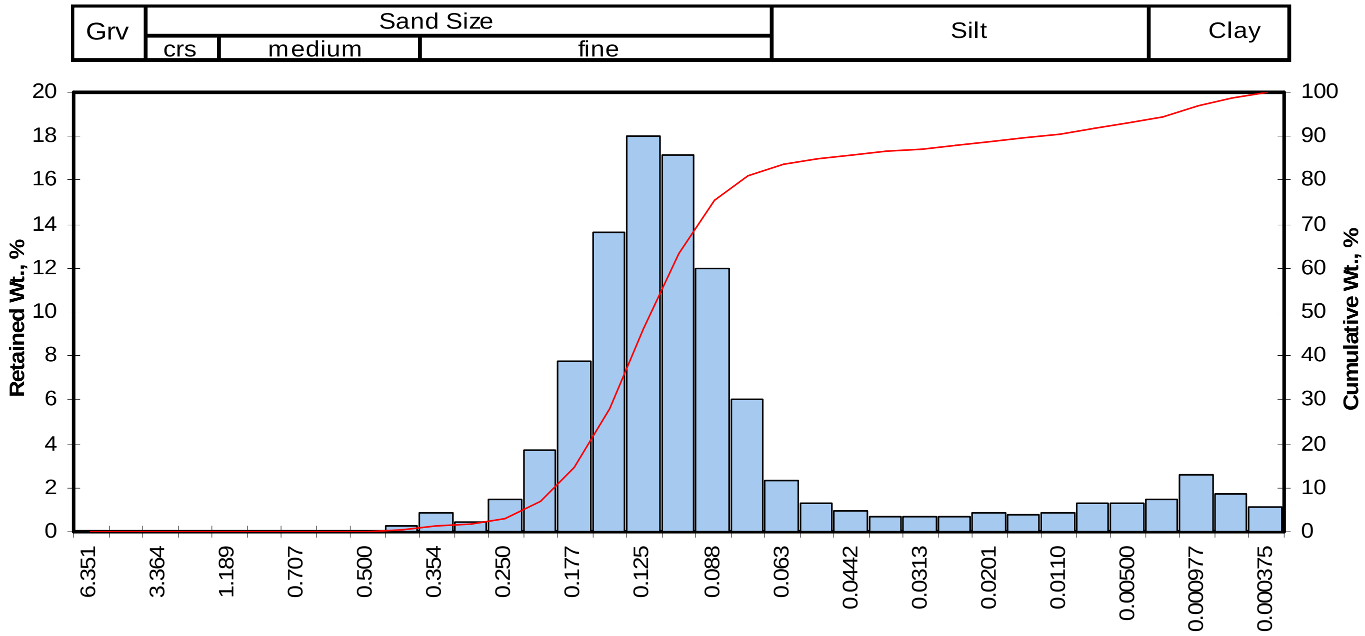
Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
DP-21 (14.0'-14.6')	14.0-14.6	Fine sand	0.133	0.00	0.00	0.94	86.46	7.85	4.75	12.60
DP-21 (16.9'-17.3')	17.1-17.3	Fine sand	0.109	0.00	0.00	0.76	76.40	16.51	6.33	22.84
DP-22 (11.3'-12.0')	11.8-12.0	Fine sand	0.133	0.00	0.00	1.08	84.70	9.05	5.17	14.22
DP-22 (13.5'-14.2')	13.5-13.7	Fine sand	0.121	0.00	0.00	0.00	79.33	13.75	6.92	20.67
DP-22 (17.7'-18.3')	17.7-17.9	Fine sand	0.082	0.00	0.00	0.00	58.10	31.19	10.70	41.90
DP-22 (20.5'-21.0')	20.5-21.0	Fine sand	0.097	0.00	0.00	0.00	76.09	18.29	5.62	23.91
DP-23 (11.0'-11.7')	11.0-11.2	Fine sand	0.119	0.00	0.00	1.98	71.45	16.50	10.06	26.57
DP-23 (14.0'-14.7')	14.0-14.2	Fine sand	0.112	0.00	0.00	0.42	74.89	15.18	9.50	24.68
DP-23 (16.0'-16.7')	16.0-16.2	Fine sand	0.105	0.00	0.00	0.00	72.78	16.98	10.24	27.22
DP-24 (13.5'-14.2')	13.5-13.7	Fine sand	0.106	0.00	0.00	0.00	73.84	17.08	9.08	26.16
DP-24 (17.0'-17.5')	17.0-17.2	Fine sand	0.108	0.00	0.00	0.00	79.18	17.18	3.65	20.82

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200
PTS File No: 47478
Sample ID: DP-1 (15.3-16.0) #1
Depth, ft: 15.3-15.5



Particle Size, mm

Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.28	0.28	0.28
0.0139	0.354	1.50	45	0.85	0.85	1.13
0.0117	0.297	1.75	50	0.42	0.42	1.55
0.0098	0.250	2.00	60	1.49	1.49	3.04
0.0083	0.210	2.25	70	3.70	3.70	6.75
0.0070	0.177	2.50	80	7.71	7.72	14.46
0.0059	0.149	2.75	100	13.60	13.61	28.08
0.0049	0.125	3.00	120	18.00	18.02	46.10
0.0041	0.105	3.25	140	17.10	17.12	63.21
0.0035	0.088	3.50	170	12.00	12.01	75.23
0.0029	0.074	3.75	200	5.99	6.00	81.22
0.0025	0.063	4.00	230	2.35	2.35	83.57
0.0021	0.053	4.25	270	1.31	1.31	84.88
0.00174	0.0442	4.50	325	0.93	0.93	85.82
0.00146	0.0372	4.75	400	0.72	0.72	86.54
0.00123	0.0313	5.00	450	0.70	0.70	87.24
0.000986	0.0250	5.32	500	0.73	0.73	87.97
0.000790	0.0201	5.64	635	0.89	0.89	88.86
0.000615	0.0156	6.00		0.81	0.81	89.67
0.000435	0.0110	6.50		0.85	0.85	90.52
0.000308	0.00781	7.00		1.25	1.25	91.77
0.000197	0.00500	7.65		1.32	1.32	93.09
0.000077	0.00195	9.00		1.49	1.49	94.58
0.000038	0.000977	10.00		2.60	2.60	97.19
0.000019	0.000488	11.00		1.69	1.69	98.88
0.000015	0.000375	11.38		1.12	1.12	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.13	0.0090	0.228
10	2.36	0.0077	0.195
16	2.53	0.0068	0.173
25	2.69	0.0061	0.155
40	2.92	0.0052	0.133
50	3.06	0.0047	0.120
60	3.20	0.0043	0.109
75	3.50	0.0035	0.089
84	4.08	0.0023	0.059
90	6.19	0.0005	0.014
95	9.16	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.06	3.06	3.06
Median, in.	0.0047	0.0047	0.0047
Median, mm	0.120	0.120	0.120
Mean, phi	3.04	3.30	3.22
Mean, in.	0.0048	0.0040	0.0042
Mean, mm	0.122	0.101	0.107
Sorting	1.320	0.777	1.453
Skewness	0.974	0.319	0.528
Kurtosis	0.181	3.525	3.592

Grain Size Description (ASTM-USCS Scale): Fine sand (based on Mean from Trask)

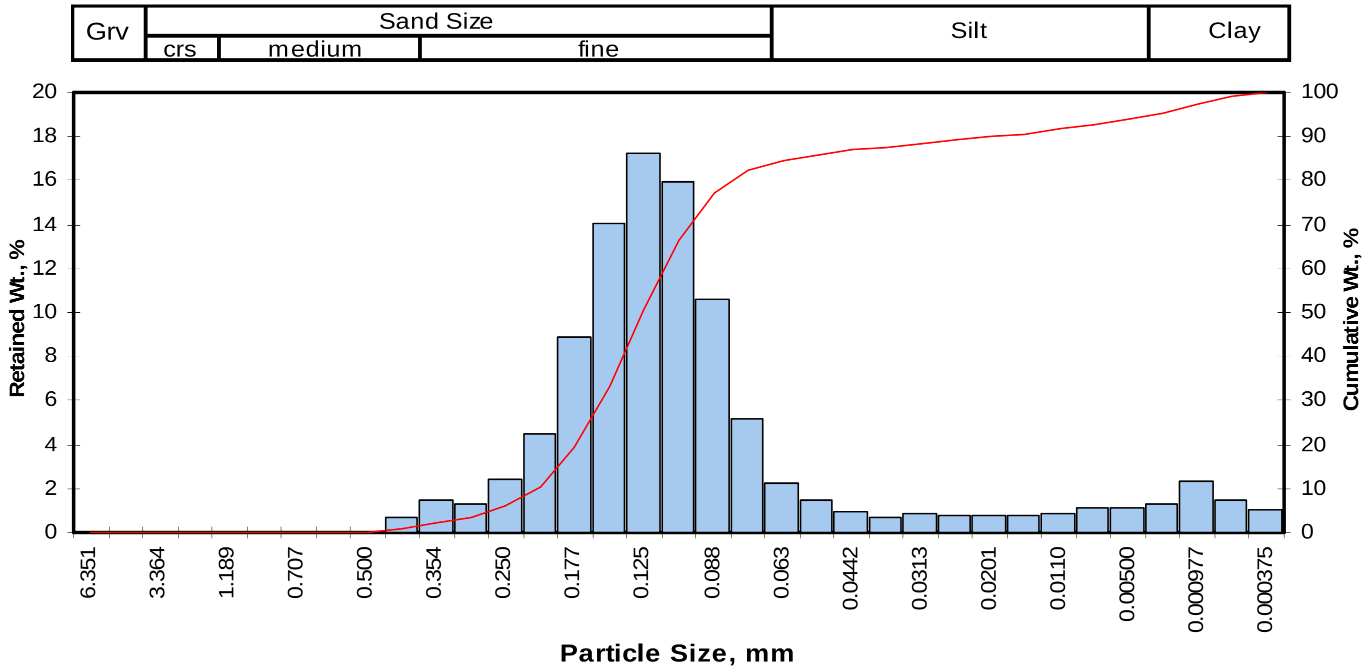
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.28
Fine Sand	200	80.94
Silt	>0.005 mm	11.87
Clay	<0.005 mm	6.91
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

PTS File No: 47478
Sample ID: DP-2 (12.0-12.6) #2
Depth, ft: 12.0-12.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.02	0.02	0.02
0.0166	0.420	1.25	40	0.71	0.71	0.73
0.0139	0.354	1.50	45	1.47	1.47	2.20
0.0117	0.297	1.75	50	1.29	1.29	3.49
0.0098	0.250	2.00	60	2.45	2.45	5.94
0.0083	0.210	2.25	70	4.50	4.50	10.44
0.0070	0.177	2.50	80	8.88	8.89	19.33
0.0059	0.149	2.75	100	14.00	14.01	33.34
0.0049	0.125	3.00	120	17.20	17.21	50.55
0.0041	0.105	3.25	140	15.90	15.91	66.46
0.0035	0.088	3.50	170	10.60	10.61	77.07
0.0029	0.074	3.75	200	5.20	5.20	82.28
0.0025	0.063	4.00	230	2.24	2.24	84.52
0.0021	0.053	4.25	270	1.43	1.43	85.95
0.00174	0.0442	4.50	325	0.95	0.95	86.90
0.00146	0.0372	4.75	400	0.68	0.68	87.58
0.00123	0.0313	5.00	450	0.82	0.82	88.40
0.000986	0.0250	5.32	500	0.79	0.79	89.19
0.000790	0.0201	5.64	635	0.76	0.76	89.95
0.000615	0.0156	6.00		0.76	0.76	90.71
0.000435	0.0110	6.50		0.89	0.89	91.60
0.000308	0.00781	7.00		1.15	1.15	92.75
0.000197	0.00500	7.65		1.10	1.10	93.86
0.000077	0.00195	9.00		1.29	1.29	95.15
0.000038	0.000977	10.00		2.31	2.31	97.46
0.000019	0.000488	11.00		1.47	1.47	98.93
0.000015	0.000375	11.38		1.07	1.07	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.90	0.0105	0.267
10	2.23	0.0084	0.214
16	2.41	0.0074	0.189
25	2.60	0.0065	0.165
40	2.85	0.0055	0.139
50	2.99	0.0049	0.126
60	3.15	0.0044	0.113
75	3.45	0.0036	0.091
84	3.94	0.0026	0.065
90	5.66	0.0008	0.020
95	8.85	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	2.99	2.99	2.99
Median, in.	0.0049	0.0049	0.0049
Median, mm	0.126	0.126	0.126
Mean, phi	2.96	3.17	3.11
Mean, in.	0.0050	0.0044	0.0045
Mean, mm	0.128	0.111	0.116
Sorting	1.343	0.768	1.436
Skewness	0.977	0.237	0.462
Kurtosis	0.189	3.520	3.347

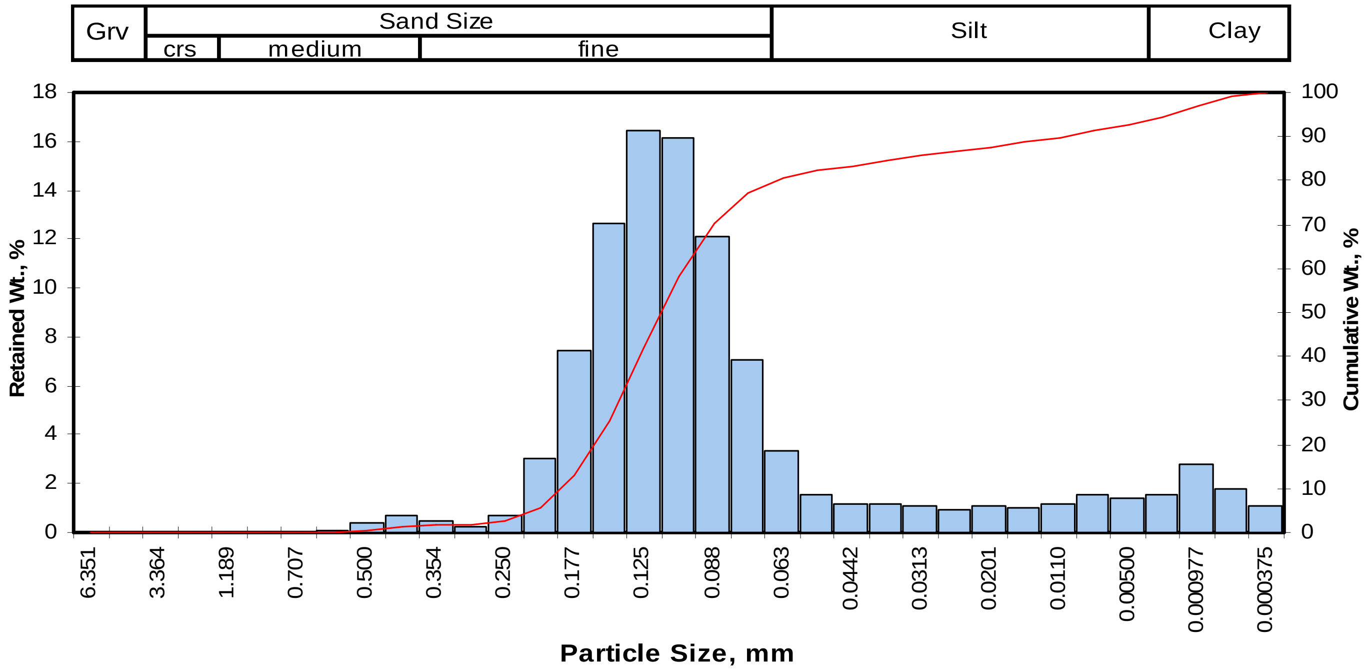
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.73
Fine Sand	200	81.55
Silt	>0.005 mm	11.58
Clay	<0.005 mm	6.14
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-4 (13.5-14.2) #3
Project No:	C05552_2017-200	**Depth, ft:**	13.5-13.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.01	0.01	0.01
0.0234	0.595	0.75	30	0.08	0.08	0.09
0.0197	0.500	1.00	35	0.35	0.35	0.44
0.0166	0.420	1.25	40	0.66	0.66	1.10
0.0139	0.354	1.50	45	0.50	0.50	1.60
0.0117	0.297	1.75	50	0.20	0.20	1.80
0.0098	0.250	2.00	60	0.73	0.73	2.53
0.0083	0.210	2.25	70	3.00	3.00	5.54
0.0070	0.177	2.50	80	7.42	7.43	12.97
0.0059	0.149	2.75	100	12.60	12.62	25.59
0.0049	0.125	3.00	120	16.40	16.42	42.01
0.0041	0.105	3.25	140	16.10	16.12	58.13
0.0035	0.088	3.50	170	12.10	12.12	70.25
0.0029	0.074	3.75	200	7.08	7.09	77.34
0.0025	0.063	4.00	230	3.32	3.32	80.66
0.0021	0.053	4.25	270	1.58	1.58	82.25
0.00174	0.0442	4.50	325	1.14	1.14	83.39
0.00146	0.0372	4.75	400	1.14	1.14	84.53
0.00123	0.0313	5.00	450	1.08	1.08	85.61
0.000986	0.0250	5.32	500	0.95	0.95	86.56
0.000790	0.0201	5.64	635	1.06	1.06	87.62
0.000615	0.0156	6.00		1.03	1.03	88.65
0.000435	0.0110	6.50		1.16	1.16	89.82
0.000308	0.00781	7.00		1.55	1.55	91.37
0.000197	0.00500	7.65		1.39	1.39	92.76
0.000077	0.00195	9.00		1.56	1.56	94.32
0.000038	0.000977	10.00		2.82	2.82	97.15
0.000019	0.000488	11.00		1.79	1.79	98.94
0.000015	0.000375	11.38		1.06	1.06	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	**Phi Value**	**Particle Size Inches**	**Particle Size Millimeters**
5	2.21	0.0085	0.217
10	2.40	0.0075	0.189
16	2.56	0.0067	0.170
25	2.74	0.0059	0.150
40	2.97	0.0050	0.128
50	3.12	0.0045	0.115
60	3.29	0.0040	0.102
75	3.67	0.0031	0.079
84	4.63	0.0016	0.040
90	6.56	0.0004	0.011
95	9.24	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.12	3.12	3.12
Median, in.	0.0045	0.0045	0.0045
Median, mm	0.115	0.115	0.115
Mean, phi	3.13	3.60	3.44
Mean, in.	0.0045	0.0033	0.0036
Mean, mm	0.114	0.083	0.092
Sorting	1.380	1.037	1.584
Skewness	0.947	0.456	0.598
Kurtosis	0.199	2.391	3.103

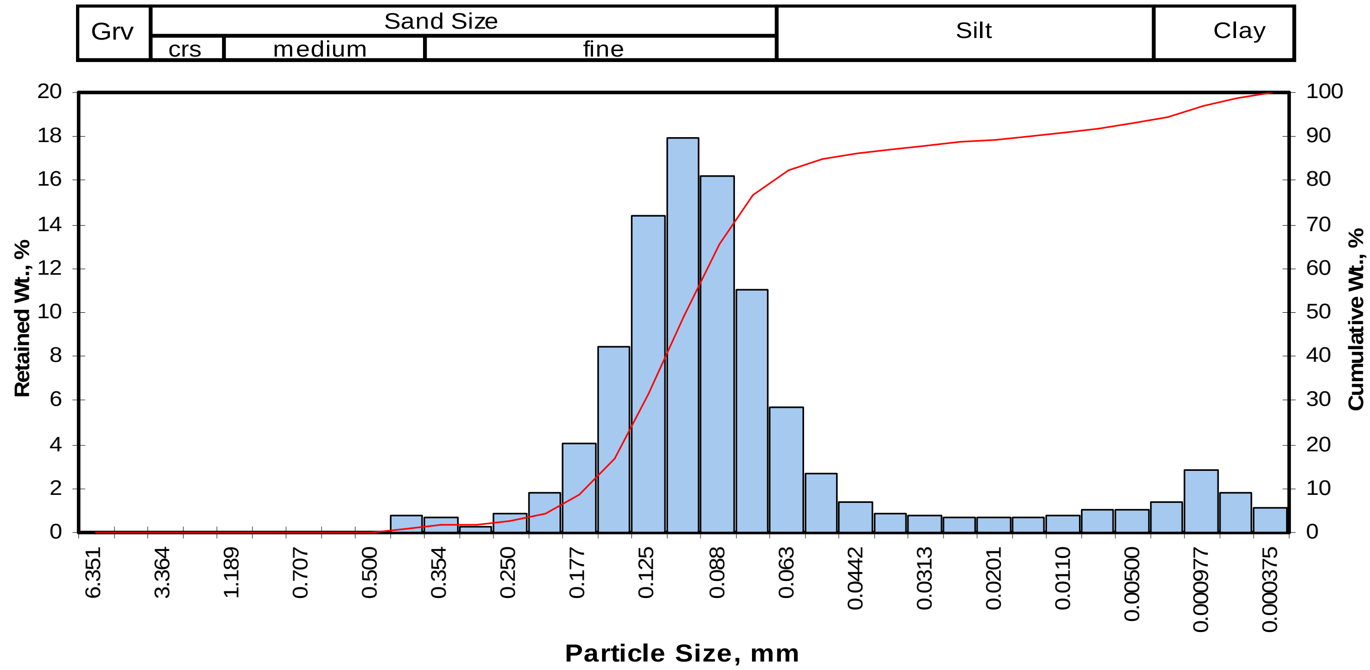
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.10
Fine Sand	200	76.24
Silt	>0.005 mm	15.42
Clay	<0.005 mm	7.24
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-5 (11.5-12.2) #4
Project No:	C05552_2017-200	**Depth, ft:**	11.5-11.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.03	0.03	0.03
0.0166	0.420	1.25	40	0.81	0.81	0.84
0.0139	0.354	1.50	45	0.71	0.71	1.55
0.0117	0.297	1.75	50	0.25	0.25	1.80
0.0098	0.250	2.00	60	0.82	0.82	2.62
0.0083	0.210	2.25	70	1.79	1.79	4.42
0.0070	0.177	2.50	80	4.07	4.08	8.49
0.0059	0.149	2.75	100	8.42	8.44	16.93
0.0049	0.125	3.00	120	14.40	14.43	31.35
0.0041	0.105	3.25	140	17.90	17.93	49.29
0.0035	0.088	3.50	170	16.20	16.23	65.52
0.0029	0.074	3.75	200	11.00	11.02	76.54
0.0025	0.063	4.00	230	5.72	5.73	82.27
0.0021	0.053	4.25	270	2.64	2.64	84.91
0.00174	0.0442	4.50	325	1.36	1.36	86.27
0.00146	0.0372	4.75	400	0.90	0.90	87.18
0.00123	0.0313	5.00	450	0.79	0.79	87.97
0.000986	0.0250	5.32	500	0.70	0.70	88.67
0.000790	0.0201	5.64	635	0.68	0.68	89.35
0.000615	0.0156	6.00		0.65	0.65	90.00
0.000435	0.0110	6.50		0.79	0.79	90.79
0.000308	0.00781	7.00		1.06	1.06	91.86
0.000197	0.00500	7.65		1.04	1.04	92.90
0.000077	0.00195	9.00		1.36	1.36	94.26
0.000038	0.000977	10.00		2.81	2.82	97.07
0.000019	0.000488	11.00		1.78	1.78	98.86
0.000015	0.000375	11.38		1.14	1.14	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.29	0.0081	0.205
10	2.54	0.0067	0.171
16	2.72	0.0060	0.152
25	2.89	0.0053	0.135
40	3.12	0.0045	0.115
50	3.26	0.0041	0.104
60	3.42	0.0037	0.094
75	3.72	0.0030	0.076
84	4.16	0.0022	0.056
90	6.00	0.0006	0.016
95	9.26	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.26	3.26	3.26
Median, in.	0.0041	0.0041	0.0041
Median, mm	0.104	0.104	0.104
Mean, phi	3.24	3.44	3.38
Mean, in.	0.0042	0.0036	0.0038
Mean, mm	0.106	0.092	0.096
Sorting	1.331	0.721	1.417
Skewness	0.972	0.253	0.487
Kurtosis	0.189	3.841	3.465

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.84
Fine Sand	200	75.70
Silt	>0.005 mm	16.36
Clay	<0.005 mm	7.10
	Total	**100**

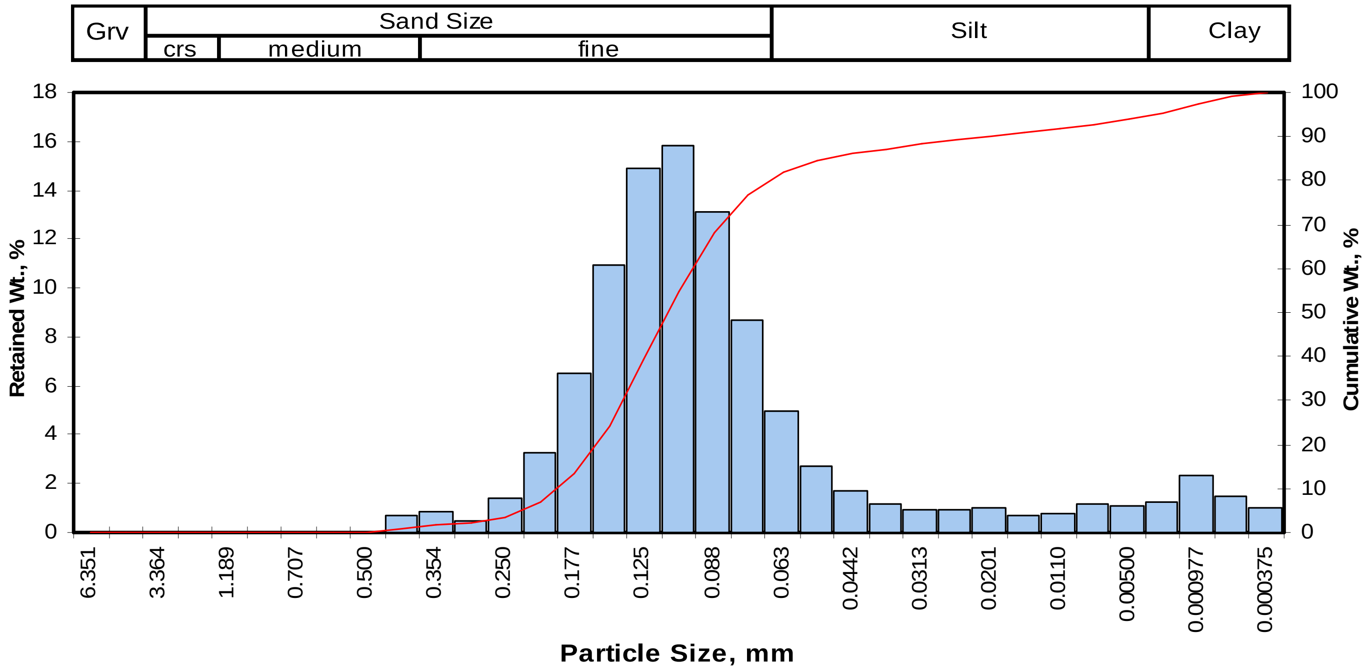
Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

PTS File No: 47478
Sample ID: DP-8 (12.0-12.7) #5
Depth, ft: 12.0-12.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.02	0.02	0.02
0.0166	0.420	1.25	40	0.68	0.68	0.70
0.0139	0.354	1.50	45	0.89	0.89	1.59
0.0117	0.297	1.75	50	0.45	0.45	2.04
0.0098	0.250	2.00	60	1.43	1.43	3.47
0.0083	0.210	2.25	70	3.23	3.23	6.71
0.0070	0.177	2.50	80	6.54	6.55	13.26
0.0059	0.149	2.75	100	10.90	10.92	24.17
0.0049	0.125	3.00	120	14.90	14.92	39.10
0.0041	0.105	3.25	140	15.80	15.82	54.92
0.0035	0.088	3.50	170	13.10	13.12	68.04
0.0029	0.074	3.75	200	8.71	8.72	76.76
0.0025	0.063	4.00	230	4.95	4.96	81.72
0.0021	0.053	4.25	270	2.71	2.71	84.44
0.00174	0.0442	4.50	325	1.69	1.69	86.13
0.00146	0.0372	4.75	400	1.14	1.14	87.27
0.00123	0.0313	5.00	450	0.94	0.94	88.21
0.000986	0.0250	5.32	500	0.92	0.92	89.13
0.000790	0.0201	5.64	635	0.99	0.99	90.12
0.000615	0.0156	6.00		0.73	0.73	90.86
0.000435	0.0110	6.50		0.80	0.80	91.66
0.000308	0.00781	7.00		1.19	1.19	92.85
0.000197	0.00500	7.65		1.12	1.12	93.97
0.000077	0.00195	9.00		1.24	1.24	95.21
0.000038	0.000977	10.00		2.35	2.35	97.57
0.000019	0.000488	11.00		1.46	1.46	99.03
0.000015	0.000375	11.38		0.97	0.97	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.12	0.0091	0.230
10	2.38	0.0076	0.193
16	2.56	0.0067	0.169
25	2.76	0.0058	0.147
40	3.01	0.0049	0.124
50	3.17	0.0044	0.111
60	3.35	0.0039	0.098
75	3.70	0.0030	0.077
84	4.21	0.0021	0.054
90	5.60	0.0008	0.021
95	8.77	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.17	3.17	3.17
Median, in.	0.0044	0.0044	0.0044
Median, mm	0.111	0.111	0.111
Mean, phi	3.16	3.39	3.31
Mean, in.	0.0044	0.0038	0.0040
Mean, mm	0.112	0.096	0.100
Sorting	1.383	0.824	1.419
Skewness	0.960	0.260	0.471
Kurtosis	0.204	3.038	2.913

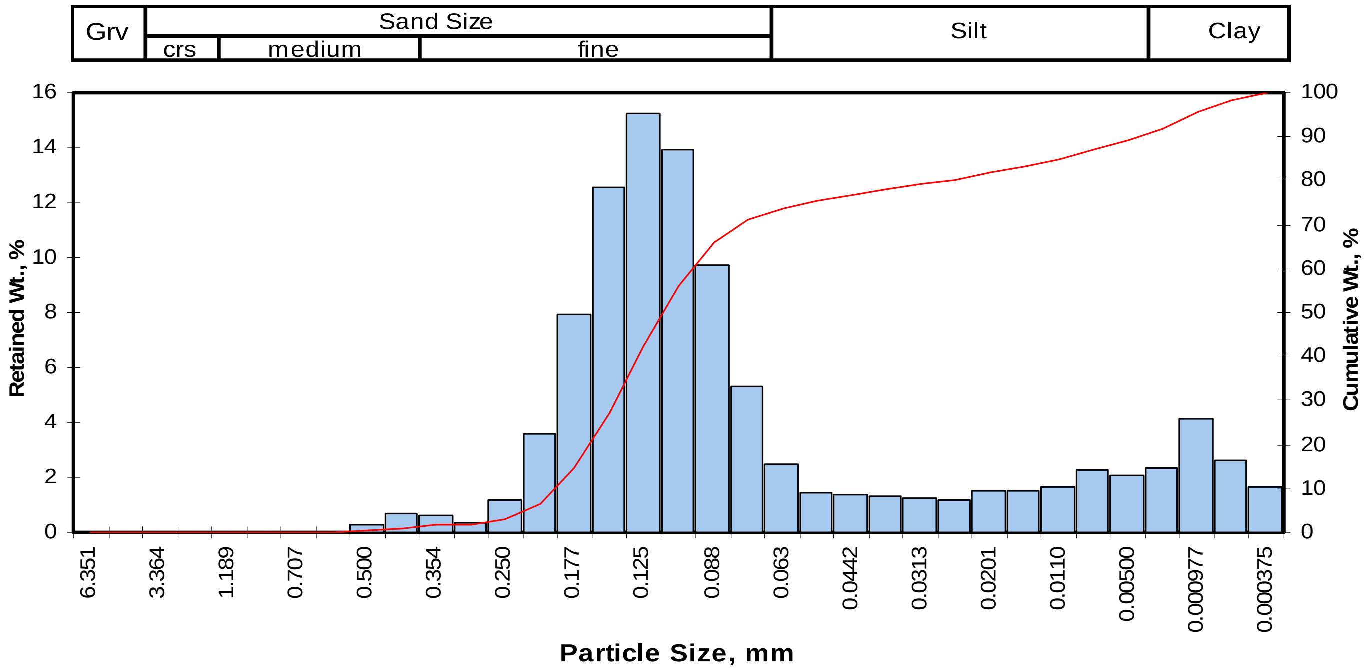
Grain Size Description (ASTM-USCS Scale): Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.70
Fine Sand	200	76.07
Silt	>0.005 mm	17.21
Clay	<0.005 mm	6.03
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-9 (8.0-8.8) #6
Project No:	C05552_2017-200	**Depth, ft:**	8.6-8.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.03	0.03	0.03
0.0197	0.500	1.00	35	0.26	0.26	0.29
0.0166	0.420	1.25	40	0.68	0.68	0.97
0.0139	0.354	1.50	45	0.60	0.60	1.57
0.0117	0.297	1.75	50	0.35	0.35	1.92
0.0098	0.250	2.00	60	1.14	1.14	3.06
0.0083	0.210	2.25	70	3.55	3.56	6.62
0.0070	0.177	2.50	80	7.91	7.92	14.54
0.0059	0.149	2.75	100	12.50	12.52	27.06
0.0049	0.125	3.00	120	15.20	15.22	42.29
0.0041	0.105	3.25	140	13.90	13.92	56.21
0.0035	0.088	3.50	170	9.73	9.75	65.95
0.0029	0.074	3.75	200	5.30	5.31	71.26
0.0025	0.063	4.00	230	2.50	2.50	73.77
0.0021	0.053	4.25	270	1.48	1.48	75.25
0.00174	0.0442	4.50	325	1.35	1.35	76.60
0.00146	0.0372	4.75	400	1.33	1.33	77.93
0.00123	0.0313	5.00	450	1.22	1.22	79.16
0.000986	0.0250	5.32	500	1.16	1.16	80.32
0.000790	0.0201	5.64	635	1.49	1.49	81.81
0.000615	0.0156	6.00		1.51	1.51	83.32
0.000435	0.0110	6.50		1.67	1.67	85.00
0.000308	0.00781	7.00		2.25	2.25	87.25
0.000197	0.00500	7.65		2.06	2.06	89.31
0.000077	0.00195	9.00		2.33	2.33	91.65
0.000038	0.000977	10.00		4.10	4.11	95.75
0.000019	0.000488	11.00		2.62	2.62	98.38
0.000015	0.000375	11.38		1.62	1.62	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.14	0.0090	0.227
10	2.36	0.0077	0.195
16	2.53	0.0068	0.173
25	2.71	0.0060	0.153
40	2.96	0.0051	0.128
50	3.14	0.0045	0.114
60	3.35	0.0039	0.098
75	4.21	0.0021	0.054
84	6.20	0.0005	0.014
90	8.04	0.0001	0.004
95	9.82	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.14	3.14	3.14
Median, in.	0.0045	0.0045	0.0045
Median, mm	0.114	0.114	0.114
Mean, phi	3.27	4.37	3.96
Mean, in.	0.0041	0.0019	0.0025
Mean, mm	0.104	0.049	0.064
Sorting	1.681	1.837	2.082
Skewness	0.801	0.668	0.704
Kurtosis	0.258	1.091	2.100

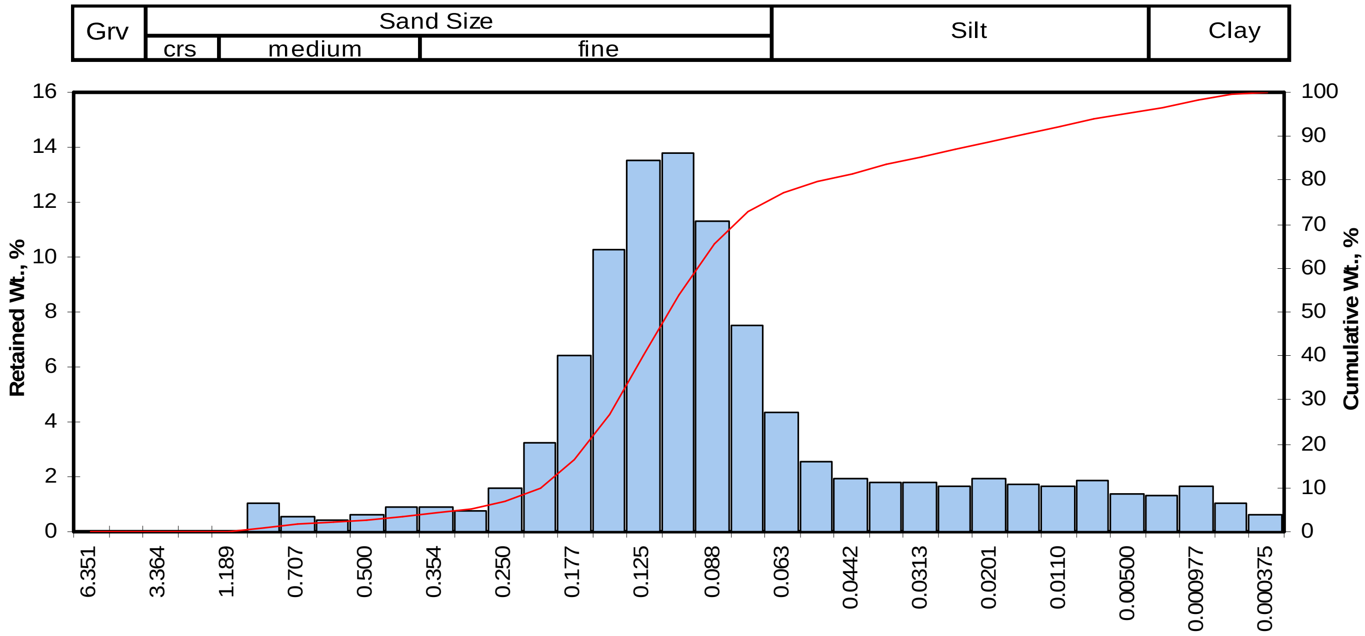
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.97
Fine Sand	200	70.30
Silt	>0.005 mm	18.05
Clay	<0.005 mm	10.69
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-13 (2.2-3.0) #7
Project No:	C05552_2017-200	**Depth, ft:**	2.2-2.4



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	1.06	1.06	1.06
0.0278	0.707	0.50	25	0.53	0.53	1.59
0.0234	0.595	0.75	30	0.38	0.38	1.97
0.0197	0.500	1.00	35	0.62	0.62	2.59
0.0166	0.420	1.25	40	0.90	0.90	3.49
0.0139	0.354	1.50	45	0.93	0.93	4.42
0.0117	0.297	1.75	50	0.75	0.75	5.17
0.0098	0.250	2.00	60	1.61	1.61	6.78
0.0083	0.210	2.25	70	3.21	3.21	9.99
0.0070	0.177	2.50	80	6.44	6.44	16.43
0.0059	0.149	2.75	100	10.30	10.30	26.73
0.0049	0.125	3.00	120	13.50	13.50	40.23
0.0041	0.105	3.25	140	13.80	13.80	54.04
0.0035	0.088	3.50	170	11.30	11.30	65.34
0.0029	0.074	3.75	200	7.53	7.53	72.87
0.0025	0.063	4.00	230	4.34	4.34	77.21
0.0021	0.053	4.25	270	2.54	2.54	79.75
0.00174	0.0442	4.50	325	1.90	1.90	81.65
0.00146	0.0372	4.75	400	1.80	1.80	83.45
0.00123	0.0313	5.00	450	1.76	1.76	85.21
0.000986	0.0250	5.32	500	1.66	1.66	86.87
0.000790	0.0201	5.64	635	1.92	1.92	88.79
0.000615	0.0156	6.00		1.70	1.70	90.49
0.000435	0.0110	6.50		1.65	1.65	92.14
0.000308	0.00781	7.00		1.86	1.86	94.00
0.000197	0.00500	7.65		1.40	1.40	95.40
0.000077	0.00195	9.00		1.28	1.28	96.68
0.000038	0.000977	10.00		1.68	1.68	98.36
0.000019	0.000488	11.00		1.00	1.00	99.36
0.000015	0.000375	11.38		0.64	0.64	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.69	0.0122	0.309
10	2.25	0.0083	0.210
16	2.48	0.0070	0.179
25	2.71	0.0060	0.153
40	3.00	0.0049	0.125
50	3.18	0.0044	0.111
60	3.38	0.0038	0.096
75	3.87	0.0027	0.068
84	4.83	0.0014	0.035
90	5.90	0.0007	0.017
95	7.46	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	3.18	3.18	3.18
Median, in.	0.0044	0.0044	0.0044
Median, mm	0.111	0.111	0.111
Mean, phi	3.18	3.66	3.50
Mean, in.	0.0044	0.0031	0.0035
Mean, mm	0.111	0.079	0.089
Sorting	1.497	1.173	1.460
Skewness	0.924	0.408	0.447
Kurtosis	0.219	1.459	2.029

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

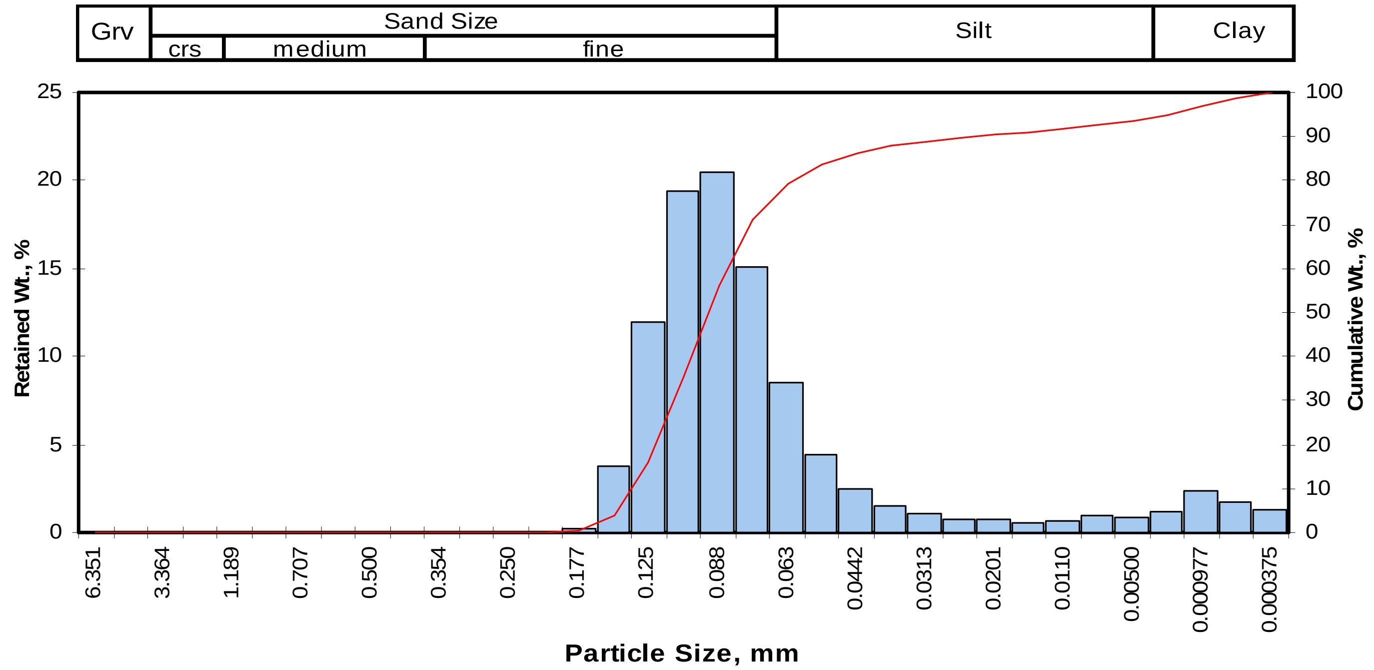
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.49
Fine Sand	200	69.38
Silt	>0.005 mm	22.53
Clay	<0.005 mm	4.60
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-13 (6.5-7.2) #8
Project No:	C0552-2017-200	**Depth, ft:**	6.5-6.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.22	0.22	0.22
0.0059	0.149	2.75	100	3.79	3.79	4.01
0.0049	0.125	3.00	120	12.00	12.01	16.03
0.0041	0.105	3.25	140	19.40	19.42	35.45
0.0035	0.088	3.50	170	20.40	20.42	55.87
0.0029	0.074	3.75	200	15.10	15.12	70.99
0.0025	0.063	4.00	230	8.45	8.46	79.45
0.0021	0.053	4.25	270	4.38	4.38	83.83
0.00174	0.0442	4.50	325	2.52	2.52	86.35
0.00146	0.0372	4.75	400	1.49	1.49	87.85
0.00123	0.0313	5.00	450	1.03	1.03	88.88
0.000986	0.0250	5.32	500	0.79	0.79	89.67
0.000790	0.0201	5.64	635	0.73	0.73	90.40
0.000615	0.0156	6.00		0.58	0.58	90.98
0.000435	0.0110	6.50		0.66	0.66	91.64
0.000308	0.00781	7.00		0.93	0.93	92.57
0.000197	0.00500	7.65		0.90	0.90	93.47
0.000077	0.00195	9.00		1.15	1.15	94.62
0.000038	0.000977	10.00		2.37	2.37	97.00
0.000019	0.000488	11.00		1.69	1.69	98.69
0.000015	0.000375	11.38		1.31	1.31	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.77	0.0058	0.147
10	2.87	0.0054	0.136
16	3.00	0.0049	0.125
25	3.12	0.0045	0.115
40	3.31	0.0040	0.101
50	3.43	0.0037	0.093
60	3.57	0.0033	0.084
75	3.87	0.0027	0.068
84	4.27	0.0020	0.052
90	5.47	0.0009	0.023
95	9.16	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.43	3.43	3.43
Median, in.	0.0037	0.0037	0.0037
Median, mm	0.093	0.093	0.093
Mean, phi	3.44	3.63	3.56
Mean, in.	0.0036	0.0032	0.0033
Mean, mm	0.092	0.081	0.085
Sorting	1.298	0.634	1.285
Skewness	0.957	0.323	0.559
Kurtosis	0.206	4.041	3.476

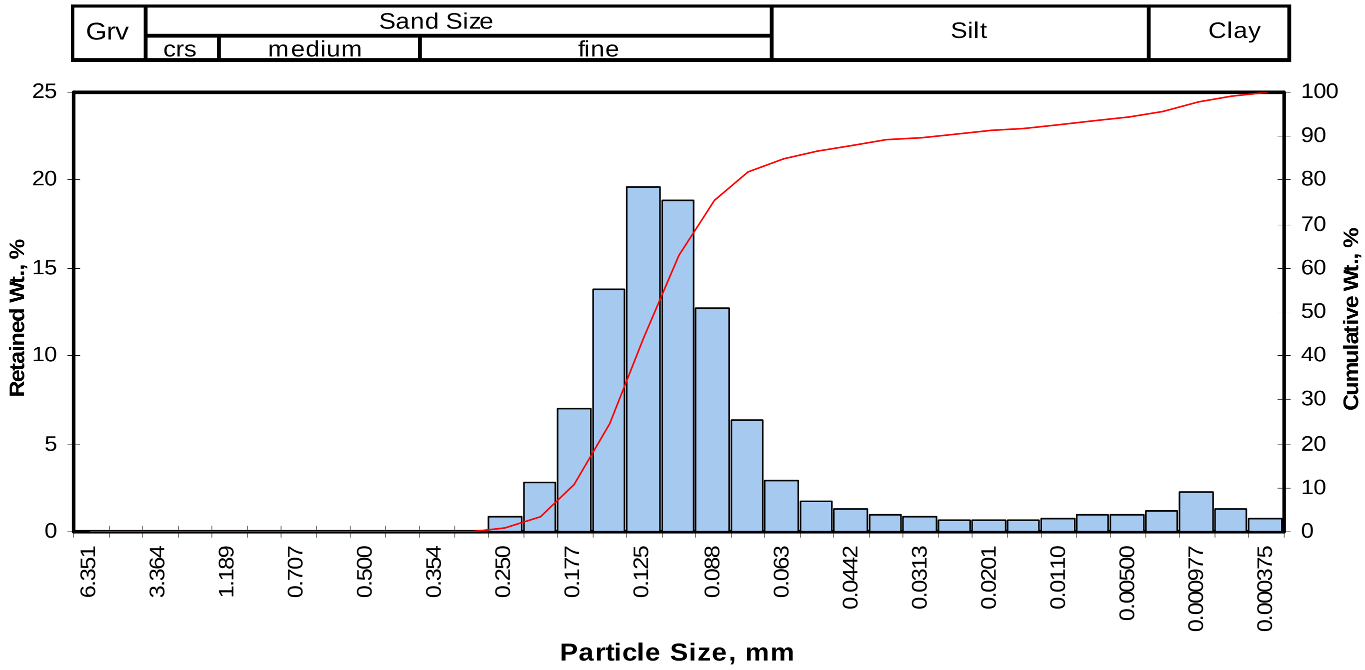
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	70.99
Silt	>0.005 mm	22.48
Clay	<0.005 mm	6.53
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-14 (6.8-7.5) #9
Project No:	C0552-2017-200	**Depth, ft:**	6.8-7.0



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.04	0.04	0.04
0.0098	0.250	2.00	60	0.85	0.85	0.89
0.0083	0.210	2.25	70	2.75	2.75	3.64
0.0070	0.177	2.50	80	6.99	7.00	10.64
0.0059	0.149	2.75	100	13.80	13.82	24.46
0.0049	0.125	3.00	120	19.60	19.62	44.08
0.0041	0.105	3.25	140	18.80	18.82	62.90
0.0035	0.088	3.50	170	12.70	12.71	75.61
0.0029	0.074	3.75	200	6.40	6.41	82.02
0.0025	0.063	4.00	230	2.88	2.88	84.90
0.0021	0.053	4.25	270	1.76	1.76	86.67
0.00174	0.0442	4.50	325	1.34	1.34	88.01
0.00146	0.0372	4.75	400	1.01	1.01	89.02
0.00123	0.0313	5.00	450	0.83	0.83	89.85
0.000986	0.0250	5.32	500	0.68	0.68	90.53
0.000790	0.0201	5.64	635	0.67	0.67	91.20
0.000615	0.0156	6.00		0.63	0.63	91.83
0.000435	0.0110	6.50		0.71	0.71	92.54
0.000308	0.00781	7.00		0.96	0.96	93.50
0.000197	0.00500	7.65		0.95	0.95	94.45
0.000077	0.00195	9.00		1.19	1.19	95.65
0.000038	0.000977	10.00		2.27	2.27	97.92
0.000019	0.000488	11.00		1.33	1.33	99.25
0.000015	0.000375	11.38		0.75	0.75	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.30	0.0080	0.203
10	2.48	0.0071	0.180
16	2.60	0.0065	0.165
25	2.76	0.0058	0.148
40	2.95	0.0051	0.130
50	3.08	0.0047	0.118
60	3.21	0.0043	0.108
75	3.49	0.0035	0.089
84	3.92	0.0026	0.066
90	5.07	0.0012	0.030
95	8.27	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	3.08	3.08	3.08
Median, in.	0.0047	0.0047	0.0047
Median, mm	0.118	0.118	0.118
Mean, phi	3.08	3.26	3.20
Mean, in.	0.0047	0.0041	0.0043
Mean, mm	0.119	0.104	0.109
Sorting	1.288	0.662	1.235
Skewness	0.970	0.273	0.506
Kurtosis	0.196	3.505	3.346
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)		

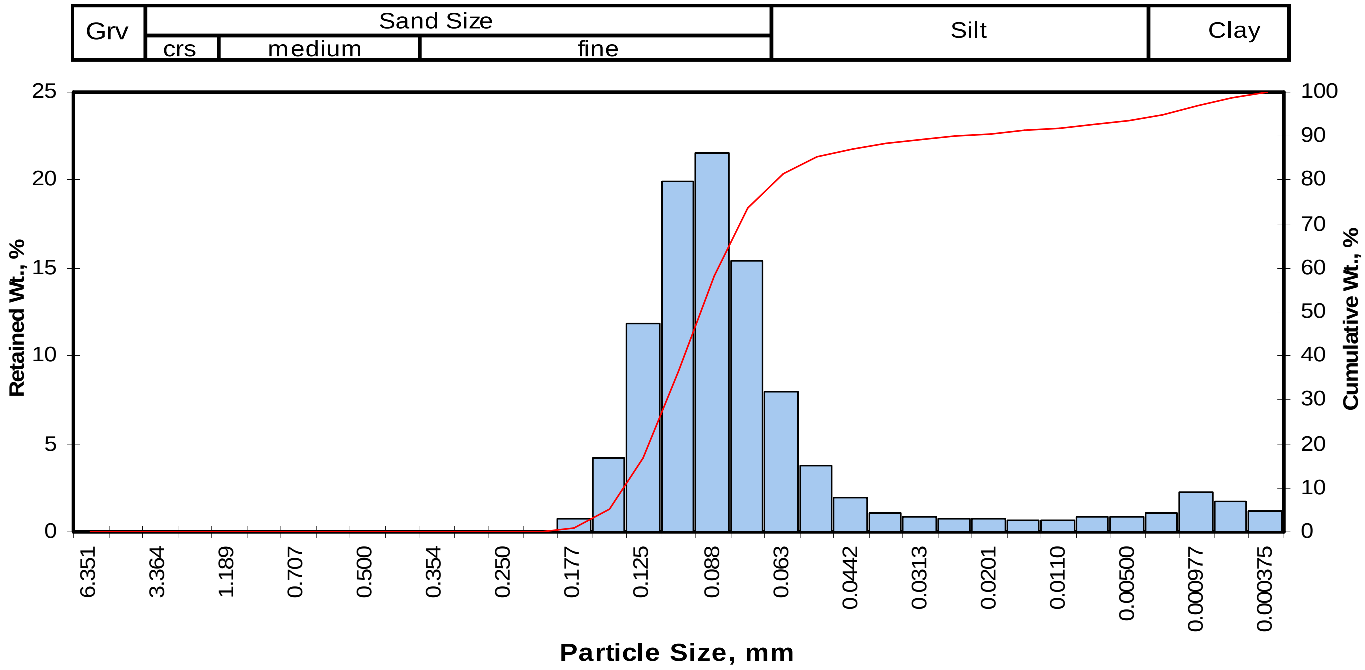
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	82.02
Silt	>0.005 mm	12.43
Clay	<0.005 mm	5.55
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C0552-2017-200

PTS File No: 47478
Sample ID: DP-14 (13.5-14.2) #10
Depth, ft: 13.5-13.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.02	0.02	0.02
0.0070	0.177	2.50	80	0.73	0.73	0.75
0.0059	0.149	2.75	100	4.20	4.20	4.96
0.0049	0.125	3.00	120	11.80	11.81	16.77
0.0041	0.105	3.25	140	19.90	19.92	36.69
0.0035	0.088	3.50	170	21.50	21.52	58.21
0.0029	0.074	3.75	200	15.40	15.42	73.63
0.0025	0.063	4.00	230	7.95	7.96	81.59
0.0021	0.053	4.25	270	3.73	3.73	85.32
0.00174	0.0442	4.50	325	1.92	1.92	87.25
0.00146	0.0372	4.75	400	1.07	1.07	88.32
0.00123	0.0313	5.00	450	0.83	0.83	89.15
0.000986	0.0250	5.32	500	0.73	0.73	89.88
0.000790	0.0201	5.64	635	0.71	0.71	90.59
0.000615	0.0156	6.00		0.60	0.60	91.19
0.000435	0.0110	6.50		0.64	0.64	91.83
0.000308	0.00781	7.00		0.90	0.90	92.73
0.000197	0.00500	7.65		0.89	0.89	93.62
0.000077	0.00195	9.00		1.08	1.08	94.70
0.000038	0.000977	10.00		2.31	2.31	97.02
0.000019	0.000488	11.00		1.75	1.75	98.77
0.000015	0.000375	11.38		1.23	1.23	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.75	0.0058	0.149
10	2.86	0.0054	0.138
16	2.98	0.0050	0.126
25	3.10	0.0046	0.116
40	3.29	0.0040	0.102
50	3.40	0.0037	0.094
60	3.53	0.0034	0.087
75	3.79	0.0028	0.072
84	4.16	0.0022	0.056
90	5.37	0.0009	0.024
95	9.13	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.40	3.40	3.40
Median, in.	0.0037	0.0037	0.0037
Median, mm	0.094	0.094	0.094
Mean, phi	3.41	3.57	3.52
Mean, in.	0.0037	0.0033	0.0034
Mean, mm	0.094	0.084	0.087
Sorting	1.270	0.589	1.261
Skewness	0.970	0.285	0.540
Kurtosis	0.194	4.415	3.789

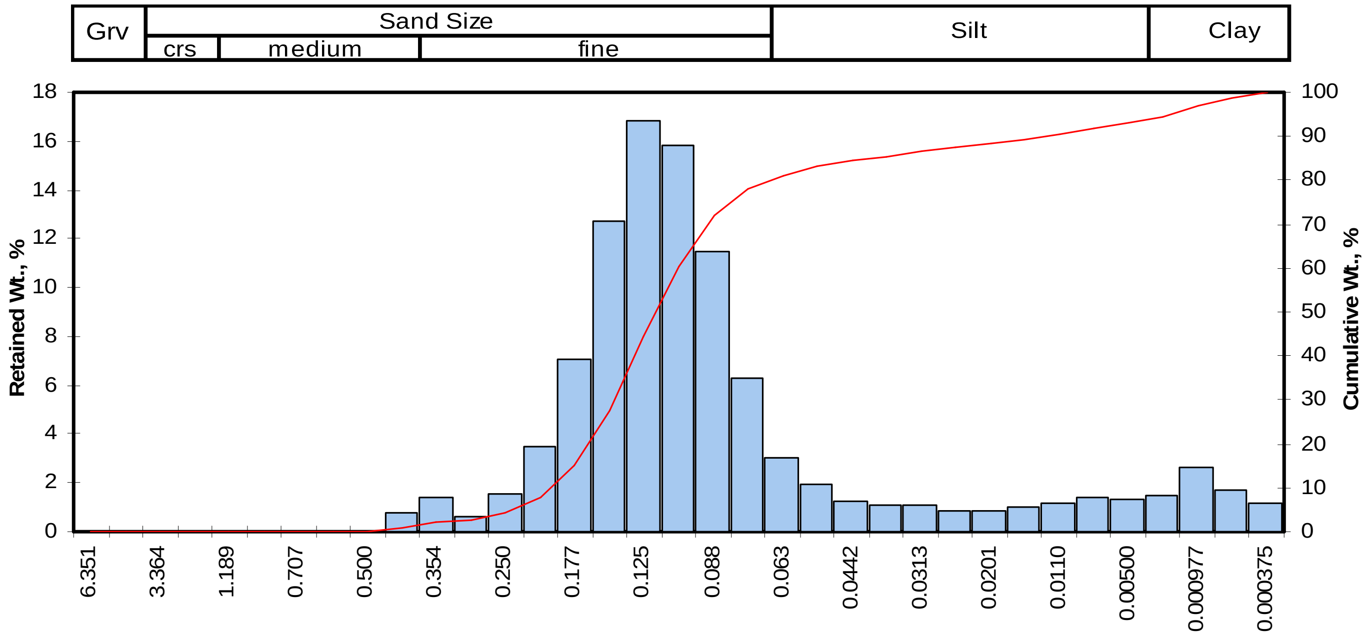
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	73.63
Silt	>0.005 mm	19.99
Clay	<0.005 mm	6.38
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-15 (6.8-7.4) #11
Project No:	C0552-2017-200	**Depth, ft:**	6.8-7.0



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.01	0.01	0.01
0.0166	0.420	1.25	40	0.80	0.80	0.81
0.0139	0.354	1.50	45	1.37	1.37	2.19
0.0117	0.297	1.75	50	0.61	0.61	2.80
0.0098	0.250	2.00	60	1.58	1.58	4.38
0.0083	0.210	2.25	70	3.46	3.46	7.84
0.0070	0.177	2.50	80	7.09	7.10	14.94
0.0059	0.149	2.75	100	12.70	12.71	27.65
0.0049	0.125	3.00	120	16.80	16.82	44.47
0.0041	0.105	3.25	140	15.80	15.82	60.29
0.0035	0.088	3.50	170	11.50	11.51	71.80
0.0029	0.074	3.75	200	6.26	6.27	78.07
0.0025	0.063	4.00	230	3.06	3.06	81.13
0.0021	0.053	4.25	270	1.93	1.93	83.06
0.00174	0.0442	4.50	325	1.22	1.22	84.28
0.00146	0.0372	4.75	400	1.05	1.05	85.33
0.00123	0.0313	5.00	450	1.10	1.10	86.44
0.000986	0.0250	5.32	500	0.89	0.89	87.33
0.000790	0.0201	5.64	635	0.88	0.88	88.21
0.000615	0.0156	6.00		0.97	0.97	89.18
0.000435	0.0110	6.50		1.16	1.16	90.34
0.000308	0.00781	7.00		1.42	1.42	91.76
0.000197	0.00500	7.65		1.28	1.28	93.04
0.000077	0.00195	9.00		1.48	1.48	94.52
0.000038	0.000977	10.00		2.60	2.60	97.13
0.000019	0.000488	11.00		1.68	1.68	98.81
0.000015	0.000375	11.38		1.19	1.19	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.04	0.0095	0.242
10	2.33	0.0079	0.199
16	2.52	0.0069	0.174
25	2.70	0.0061	0.154
40	2.93	0.0052	0.131
50	3.09	0.0046	0.118
60	3.25	0.0042	0.105
75	3.63	0.0032	0.081
84	4.44	0.0018	0.046
90	6.35	0.0005	0.012
95	9.18	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.09	3.09	3.09
Median, in.	0.0046	0.0046	0.0046
Median, mm	0.118	0.118	0.118
Mean, phi	3.09	3.48	3.35
Mean, in.	0.0046	0.0035	0.0039
Mean, mm	0.118	0.090	0.098
Sorting	1.380	0.961	1.562
Skewness	0.949	0.410	0.559
Kurtosis	0.196	2.715	3.146

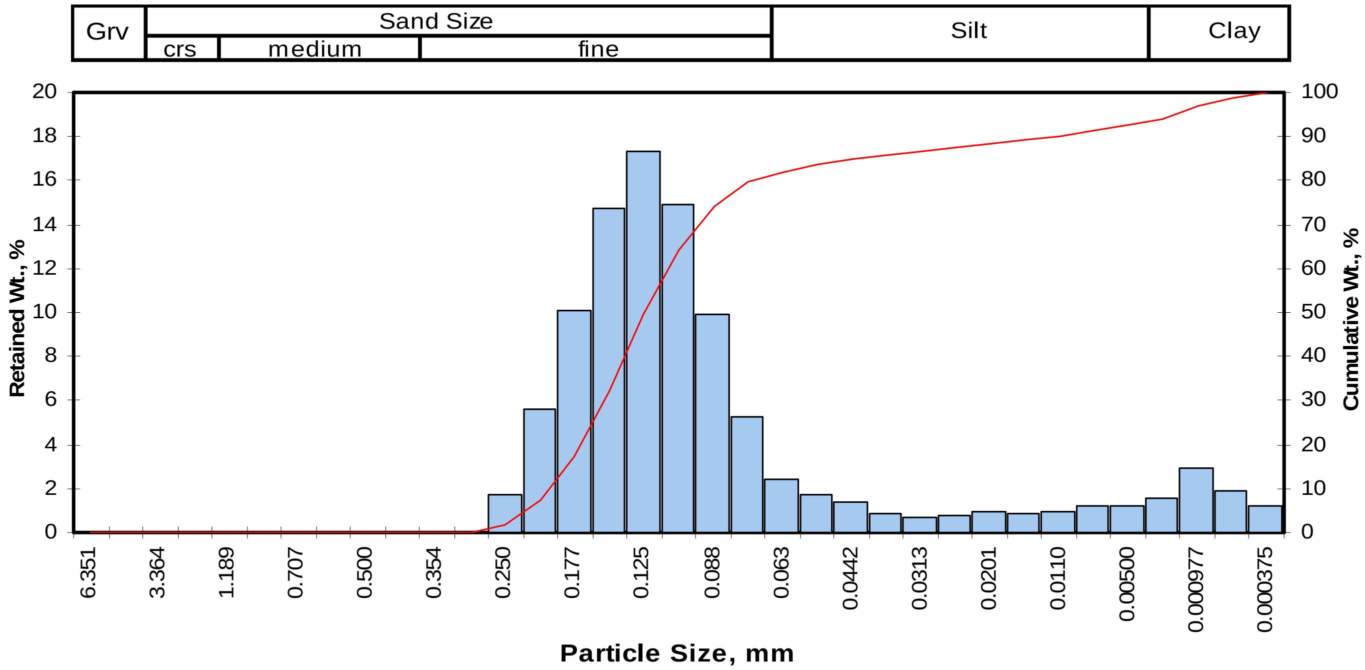
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.81
Fine Sand	200	77.25
Silt	>0.005 mm	14.98
Clay	<0.005 mm	6.96
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-15 (11.0-11.7) #12
Project No:	C0552-2017-200	**Depth, ft:**	11.0-11.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.04	0.04	0.04
0.0098	0.250	2.00	60	1.72	1.72	1.76
0.0083	0.210	2.25	70	5.56	5.56	7.32
0.0070	0.177	2.50	80	10.10	10.11	17.43
0.0059	0.149	2.75	100	14.70	14.71	32.14
0.0049	0.125	3.00	120	17.30	17.31	49.44
0.0041	0.105	3.25	140	14.90	14.91	64.35
0.0035	0.088	3.50	170	9.95	9.96	74.31
0.0029	0.074	3.75	200	5.24	5.24	79.55
0.0025	0.063	4.00	230	2.39	2.39	81.94
0.0021	0.053	4.25	270	1.69	1.69	83.63
0.00174	0.0442	4.50	325	1.34	1.34	84.97
0.00146	0.0372	4.75	400	0.83	0.83	85.80
0.00123	0.0313	5.00	450	0.71	0.71	86.51
0.000986	0.0250	5.32	500	0.79	0.79	87.30
0.000790	0.0201	5.64	635	0.93	0.93	88.23
0.000615	0.0156	6.00		0.85	0.85	89.08
0.000435	0.0110	6.50		0.93	0.93	90.01
0.000308	0.00781	7.00		1.24	1.24	91.26
0.000197	0.00500	7.65		1.21	1.21	92.47
0.000077	0.00195	9.00		1.52	1.52	93.99
0.000038	0.000977	10.00		2.93	2.93	96.92
0.000019	0.000488	11.00		1.88	1.88	98.80
0.000015	0.000375	11.38		1.20	1.20	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.15	0.0089	0.226
10	2.32	0.0079	0.201
16	2.46	0.0071	0.181
25	2.63	0.0064	0.162
40	2.86	0.0054	0.137
50	3.01	0.0049	0.124
60	3.18	0.0044	0.111
75	3.53	0.0034	0.086
84	4.32	0.0020	0.050
90	6.49	0.0004	0.011
95	9.35	0.0001	0.002

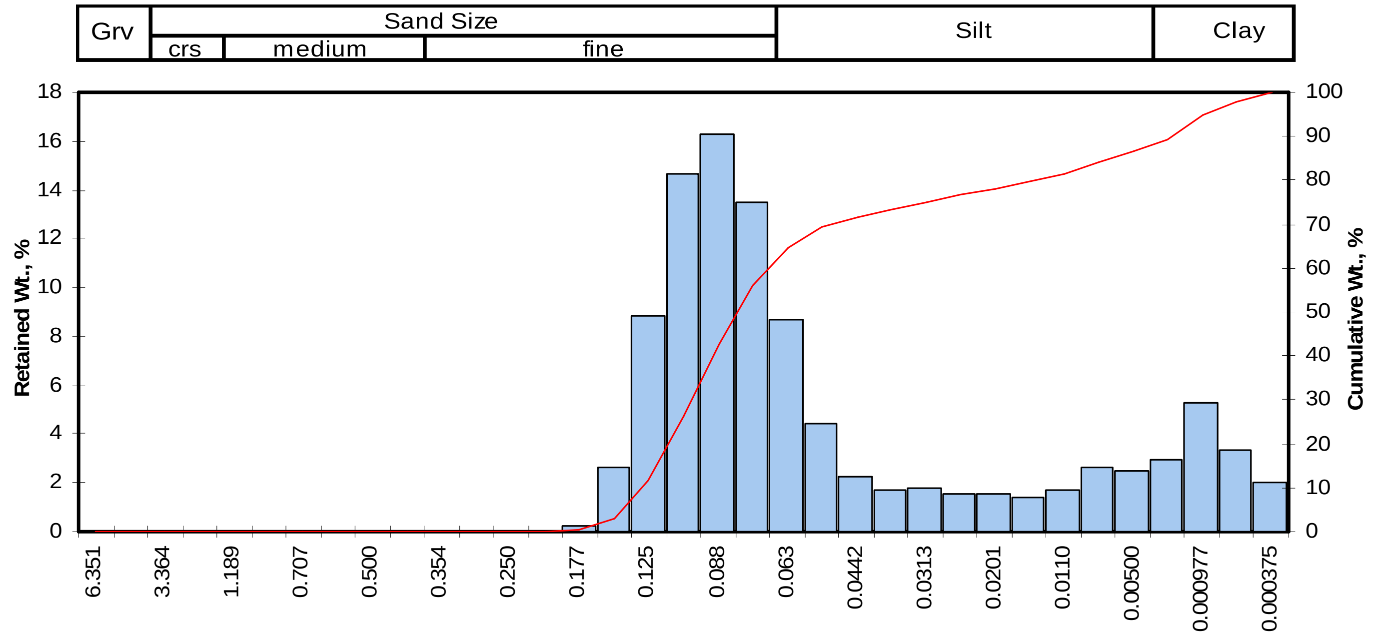
Measure	Trask	Inman	Folk-Ward
Median, phi	3.01	3.01	3.01
Median, in.	0.0049	0.0049	0.0049
Median, mm	0.124	0.124	0.124
Mean, phi	3.01	3.39	3.26
Mean, in.	0.0049	0.0038	0.0041
Mean, mm	0.124	0.095	0.104
Sorting	1.368	0.927	1.554
Skewness	0.952	0.412	0.586
Kurtosis	0.198	2.883	3.263

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	79.55
Silt	>0.005 mm	12.92
Clay	<0.005 mm	7.53
	Total	**100**

PTS Laboratories, Inc. — Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-17 (4.4-5.0) #16
Project No:	C0552-2017-200	**Depth, ft:**	4.4-4.6



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.00	0.00	0.00
0.0070	0.177	2.50	80	0.25	0.25	0.25
0.0059	0.149	2.75	100	2.60	2.60	2.86
0.0049	0.125	3.00	120	8.84	8.86	11.71
0.0041	0.105	3.25	140	14.60	14.63	26.34
0.0035	0.088	3.50	170	16.30	16.33	42.67
0.0029	0.074	3.75	200	13.50	13.53	56.20
0.0025	0.063	4.00	230	8.64	8.66	64.85
0.0021	0.053	4.25	270	4.39	4.40	69.25
0.00174	0.0442	4.50	325	2.23	2.23	71.49
0.00146	0.0372	4.75	400	1.74	1.74	73.23
0.00123	0.0313	5.00	450	1.76	1.76	74.99
0.000986	0.0250	5.32	500	1.58	1.58	76.58
0.000790	0.0201	5.64	635	1.57	1.57	78.15
0.000615	0.0156	6.00		1.41	1.41	79.56
0.000435	0.0110	6.50		1.74	1.74	81.31
0.000308	0.00781	7.00		2.60	2.60	83.91
0.000197	0.00500	7.65		2.51	2.51	86.42
0.000077	0.00195	9.00		2.95	2.96	89.38
0.000038	0.000977	10.00		5.27	5.28	94.66
0.000019	0.000488	11.00		3.30	3.31	97.97
0.000015	0.000375	11.38		2.03	2.03	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.81	0.0056	0.143
10	2.95	0.0051	0.129
16	3.07	0.0047	0.119
25	3.23	0.0042	0.107
40	3.46	0.0036	0.091
50	3.64	0.0032	0.080
60	3.86	0.0027	0.069
75	5.00	0.0012	0.031
84	7.02	0.0003	0.008
90	9.12	0.0001	0.002
95	10.10	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.64	3.64	3.64
Median, in.	0.0032	0.0032	0.0032
Median, mm	0.080	0.080	0.080
Mean, phi	3.86	5.05	4.58
Mean, in.	0.0027	0.0012	0.0016
Mean, mm	0.069	0.030	0.042
Sorting	1.850	1.975	2.092
Skewness	0.718	0.715	0.745
Kurtosis	0.296	0.846	1.684

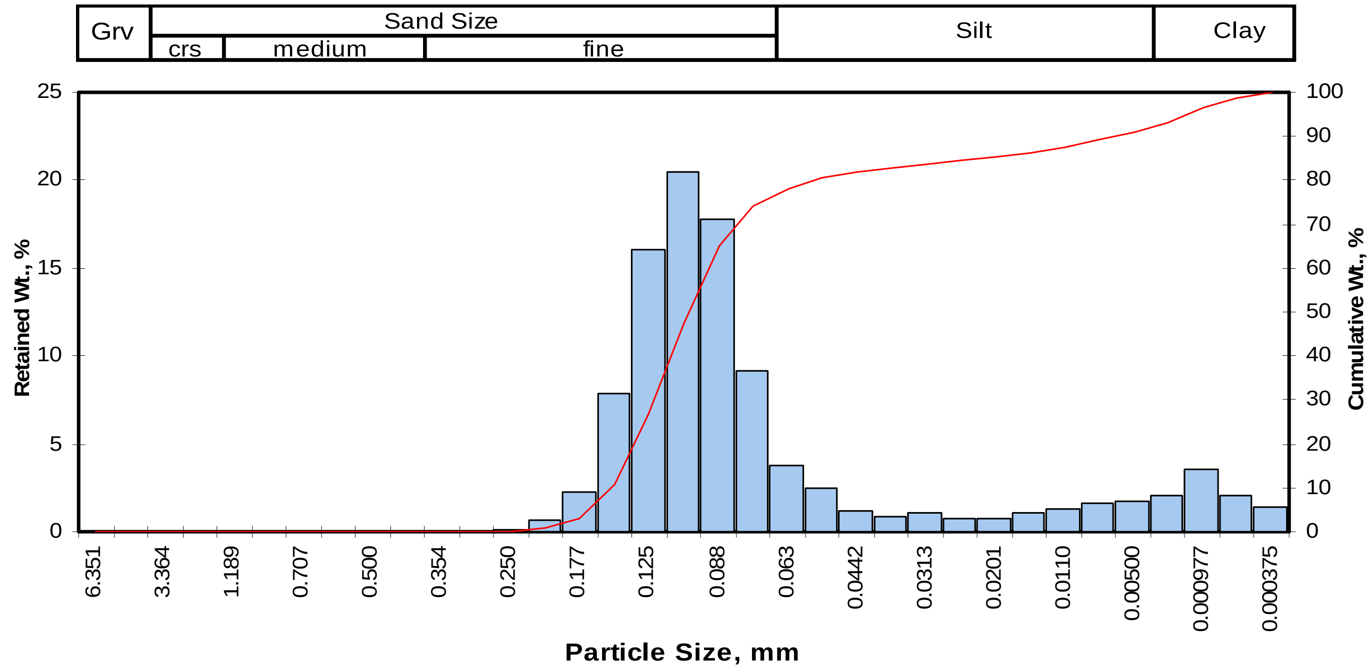
Grain Size Description (ASTM-USCS Scale)	Silt (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	56.20
Silt	>0.005 mm	30.23
Clay	<0.005 mm	13.58
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-18 (3.5-4.2) #17
Project No:	C0552-2017-200	**Depth, ft:**	4.0-4.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.07	0.07	0.07
0.0083	0.210	2.25	70	0.62	0.62	0.69
0.0070	0.177	2.50	80	2.31	2.31	3.01
0.0059	0.149	2.75	100	7.81	7.82	10.83
0.0049	0.125	3.00	120	16.00	16.02	26.84
0.0041	0.105	3.25	140	20.50	20.52	47.36
0.0035	0.088	3.50	170	17.80	17.82	65.18
0.0029	0.074	3.75	200	9.15	9.16	74.34
0.0025	0.063	4.00	230	3.77	3.77	78.12
0.0021	0.053	4.25	270	2.46	2.46	80.58
0.00174	0.0442	4.50	325	1.16	1.16	81.74
0.00146	0.0372	4.75	400	0.86	0.86	82.60
0.00123	0.0313	5.00	450	1.04	1.04	83.64
0.000986	0.0250	5.32	500	0.79	0.79	84.43
0.000790	0.0201	5.64	635	0.80	0.80	85.23
0.000615	0.0156	6.00		1.10	1.10	86.34
0.000435	0.0110	6.50		1.26	1.26	87.60
0.000308	0.00781	7.00		1.63	1.63	89.23
0.000197	0.00500	7.65		1.68	1.68	90.91
0.000077	0.00195	9.00		2.07	2.07	92.98
0.000038	0.000977	10.00		3.60	3.60	96.59
0.000019	0.000488	11.00		2.04	2.04	98.63
0.000015	0.000375	11.38		1.37	1.37	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.56	0.0067	0.169
10	2.72	0.0060	0.151
16	2.83	0.0055	0.141
25	2.97	0.0050	0.128
40	3.16	0.0044	0.112
50	3.29	0.0040	0.102
60	3.43	0.0037	0.093
75	3.79	0.0028	0.072
84	5.14	0.0011	0.028
90	7.30	0.0003	0.006
95	9.56	0.0001	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.29	3.29	3.29
Median, in.	0.0040	0.0040	0.0040
Median, mm	0.102	0.102	0.102
Mean, phi	3.32	3.99	3.75
Mean, in.	0.0039	0.0025	0.0029
Mean, mm	0.100	0.063	0.074
Sorting	1.330	1.157	1.638
Skewness	0.936	0.606	0.699
Kurtosis	0.191	2.024	3.487

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

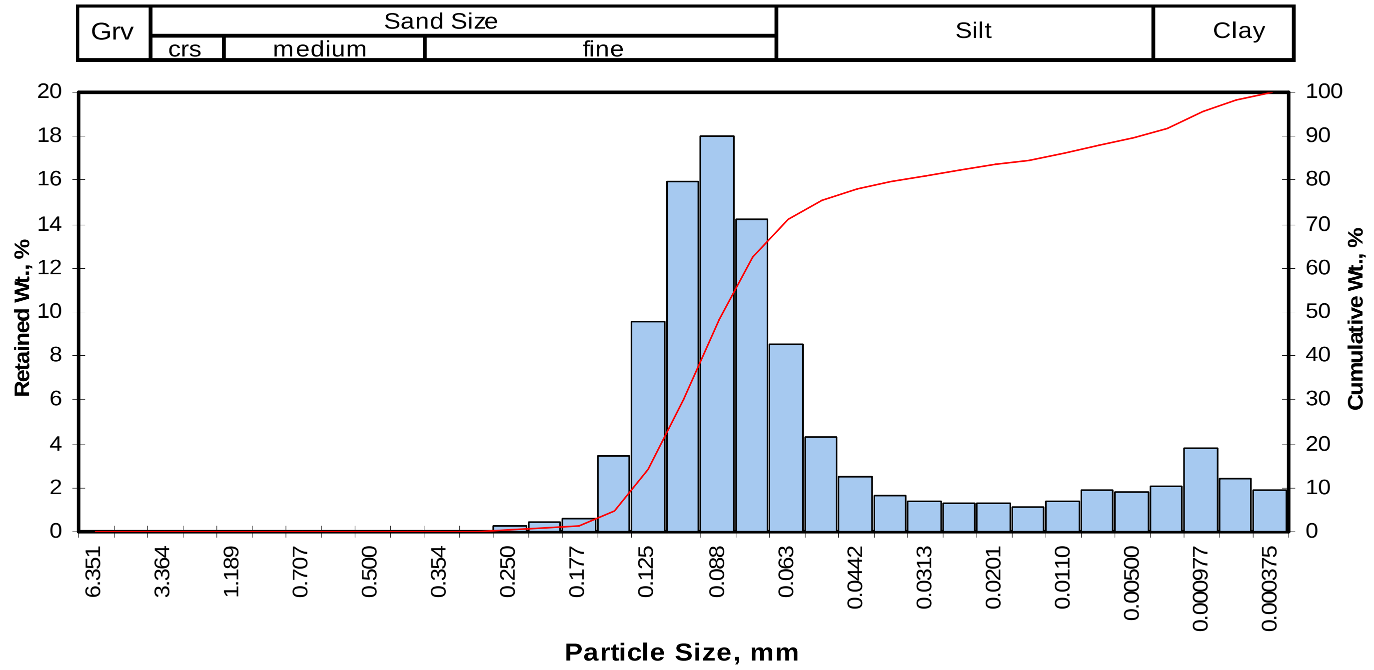
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	74.34
Silt	>0.005 mm	16.57
Clay	<0.005 mm	9.09
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-18 (6.5-7.2) #18
Project No:	C0552-2017-200	**Depth, ft:**	6.5-6.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.25	0.25	0.25
0.0083	0.210	2.25	70	0.40	0.40	0.65
0.0070	0.177	2.50	80	0.61	0.61	1.27
0.0059	0.149	2.75	100	3.44	3.45	4.71
0.0049	0.125	3.00	120	9.57	9.59	14.30
0.0041	0.105	3.25	140	15.90	15.93	30.24
0.0035	0.088	3.50	170	18.00	18.04	48.28
0.0029	0.074	3.75	200	14.20	14.23	62.51
0.0025	0.063	4.00	230	8.53	8.55	71.06
0.0021	0.053	4.25	270	4.34	4.35	75.41
0.00174	0.0442	4.50	325	2.47	2.48	77.88
0.00146	0.0372	4.75	400	1.67	1.67	79.56
0.00123	0.0313	5.00	450	1.37	1.37	80.93
0.000986	0.0250	5.32	500	1.30	1.30	82.23
0.000790	0.0201	5.64	635	1.29	1.29	83.52
0.000615	0.0156	6.00		1.14	1.14	84.67
0.000435	0.0110	6.50		1.37	1.37	86.04
0.000308	0.00781	7.00		1.89	1.89	87.93
0.000197	0.00500	7.65		1.82	1.82	89.76
0.000077	0.00195	9.00		2.09	2.09	91.85
0.000038	0.000977	10.00		3.79	3.80	95.65
0.000019	0.000488	11.00		2.45	2.46	98.11
0.000015	0.000375	11.38		1.89	1.89	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.76	0.0058	0.148
10	2.89	0.0053	0.135
16	3.03	0.0048	0.123
25	3.17	0.0044	0.111
40	3.39	0.0038	0.096
50	3.53	0.0034	0.087
60	3.71	0.0030	0.077
75	4.23	0.0021	0.053
84	5.79	0.0007	0.018
90	7.80	0.0002	0.004
95	9.83	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.53	3.53	3.53
Median, in.	0.0034	0.0034	0.0034
Median, mm	0.087	0.087	0.087
Mean, phi	3.60	4.41	4.12
Mean, in.	0.0032	0.0019	0.0023
Mean, mm	0.082	0.047	0.058
Sorting	1.443	1.382	1.762
Skewness	0.891	0.635	0.708
Kurtosis	0.221	1.559	2.737

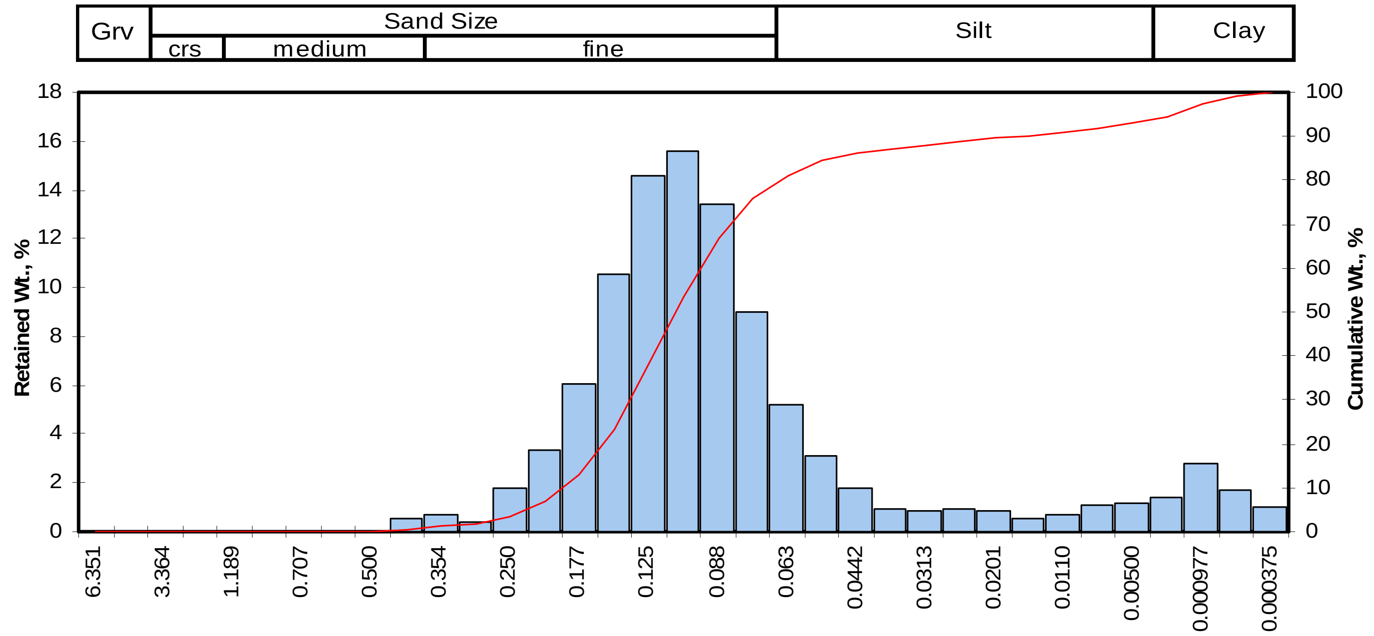
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	62.51
Silt	>0.005 mm	27.25
Clay	<0.005 mm	10.24
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-20 (6.2-6.8) #19
Project No:	C0552-2017-200	**Depth, ft:**	6.6-6.8



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.01	0.01	0.01
0.0166	0.420	1.25	40	0.52	0.52	0.53
0.0139	0.354	1.50	45	0.70	0.70	1.23
0.0117	0.297	1.75	50	0.39	0.39	1.62
0.0098	0.250	2.00	60	1.79	1.79	3.41
0.0083	0.210	2.25	70	3.31	3.31	6.73
0.0070	0.177	2.50	80	6.06	6.07	12.80
0.0059	0.149	2.75	100	10.50	10.51	23.31
0.0049	0.125	3.00	120	14.60	14.62	37.93
0.0041	0.105	3.25	140	15.60	15.62	53.55
0.0035	0.088	3.50	170	13.40	13.42	66.97
0.0029	0.074	3.75	200	8.96	8.97	75.95
0.0025	0.063	4.00	230	5.21	5.22	81.16
0.0021	0.053	4.25	270	3.13	3.13	84.30
0.00174	0.0442	4.50	325	1.75	1.75	86.05
0.00146	0.0372	4.75	400	0.90	0.90	86.95
0.00123	0.0313	5.00	450	0.84	0.84	87.79
0.000986	0.0250	5.32	500	0.92	0.92	88.71
0.000790	0.0201	5.64	635	0.88	0.88	89.60
0.000615	0.0156	6.00		0.57	0.57	90.17
0.000435	0.0110	6.50		0.67	0.67	90.84
0.000308	0.00781	7.00		1.09	1.09	91.93
0.000197	0.00500	7.65		1.13	1.13	93.06
0.000077	0.00195	9.00		1.41	1.41	94.47
0.000038	0.000977	10.00		2.82	2.82	97.30
0.000019	0.000488	11.00		1.73	1.73	99.03
0.000015	0.000375	11.38		0.97	0.97	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.12	0.0091	0.230
10	2.38	0.0075	0.191
16	2.58	0.0066	0.168
25	2.78	0.0057	0.146
40	3.03	0.0048	0.122
50	3.19	0.0043	0.109
60	3.37	0.0038	0.097
75	3.72	0.0030	0.076
84	4.23	0.0021	0.053
90	5.90	0.0007	0.017
95	9.19	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.19	3.19	3.19
Median, in.	0.0043	0.0043	0.0043
Median, mm	0.109	0.109	0.109
Mean, phi	3.18	3.40	3.33
Mean, in.	0.0044	0.0037	0.0039
Mean, mm	0.111	0.095	0.099
Sorting	1.387	0.825	1.483
Skewness	0.961	0.252	0.474
Kurtosis	0.200	3.283	3.066

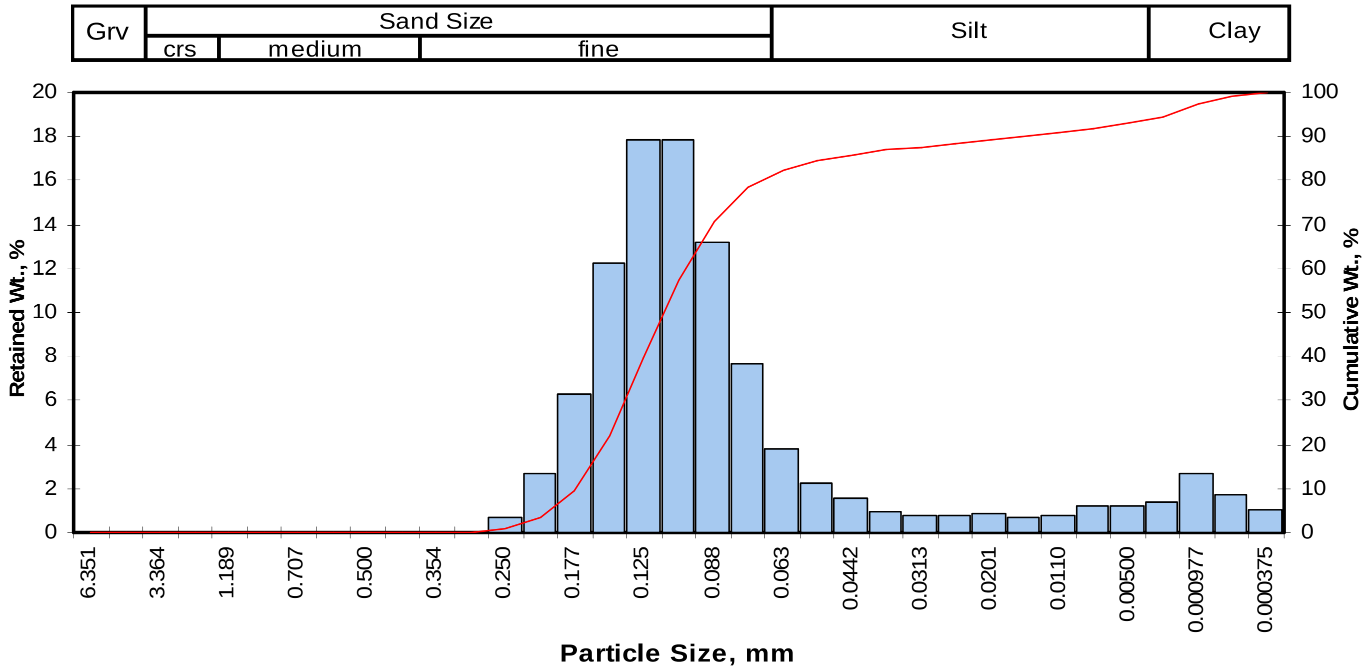
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.53
Fine Sand	200	75.42
Silt	>0.005 mm	17.11
Clay	<0.005 mm	6.94
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-20 (8.0-8.8) #20
Project No:	C0552-2017-200	**Depth, ft:**	8.0-8.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.02	0.02	0.02
0.0098	0.250	2.00	60	0.71	0.71	0.73
0.0083	0.210	2.25	70	2.63	2.63	3.36
0.0070	0.177	2.50	80	6.27	6.28	9.64
0.0059	0.149	2.75	100	12.20	12.21	21.85
0.0049	0.125	3.00	120	17.80	17.82	39.67
0.0041	0.105	3.25	140	17.80	17.82	57.49
0.0035	0.088	3.50	170	13.20	13.21	70.70
0.0029	0.074	3.75	200	7.67	7.68	78.38
0.0025	0.063	4.00	230	3.77	3.77	82.15
0.0021	0.053	4.25	270	2.20	2.20	84.35
0.00174	0.0442	4.50	325	1.56	1.56	85.92
0.00146	0.0372	4.75	400	0.98	0.98	86.90
0.00123	0.0313	5.00	450	0.78	0.78	87.68
0.000986	0.0250	5.32	500	0.76	0.76	88.44
0.000790	0.0201	5.64	635	0.86	0.86	89.30
0.000615	0.0156	6.00		0.73	0.73	90.03
0.000435	0.0110	6.50		0.80	0.80	90.83
0.000308	0.00781	7.00		1.17	1.17	92.00
0.000197	0.00500	7.65		1.17	1.17	93.17
0.000077	0.00195	9.00		1.40	1.40	94.57
0.000038	0.000977	10.00		2.70	2.70	97.28
0.000019	0.000488	11.00		1.69	1.69	98.97
0.000015	0.000375	11.38		1.03	1.03	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.32	0.0079	0.201
10	2.51	0.0069	0.176
16	2.63	0.0064	0.162
25	2.79	0.0057	0.144
40	3.00	0.0049	0.125
50	3.14	0.0045	0.113
60	3.30	0.0040	0.102
75	3.64	0.0032	0.080
84	4.21	0.0021	0.054
90	5.99	0.0006	0.016
95	9.16	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.14	3.14	3.14
Median, in.	0.0045	0.0045	0.0045
Median, mm	0.113	0.113	0.113
Mean, phi	3.16	3.42	3.33
Mean, in.	0.0044	0.0037	0.0039
Mean, mm	0.112	0.093	0.100
Sorting	1.341	0.790	1.432
Skewness	0.951	0.348	0.553
Kurtosis	0.200	3.332	3.315

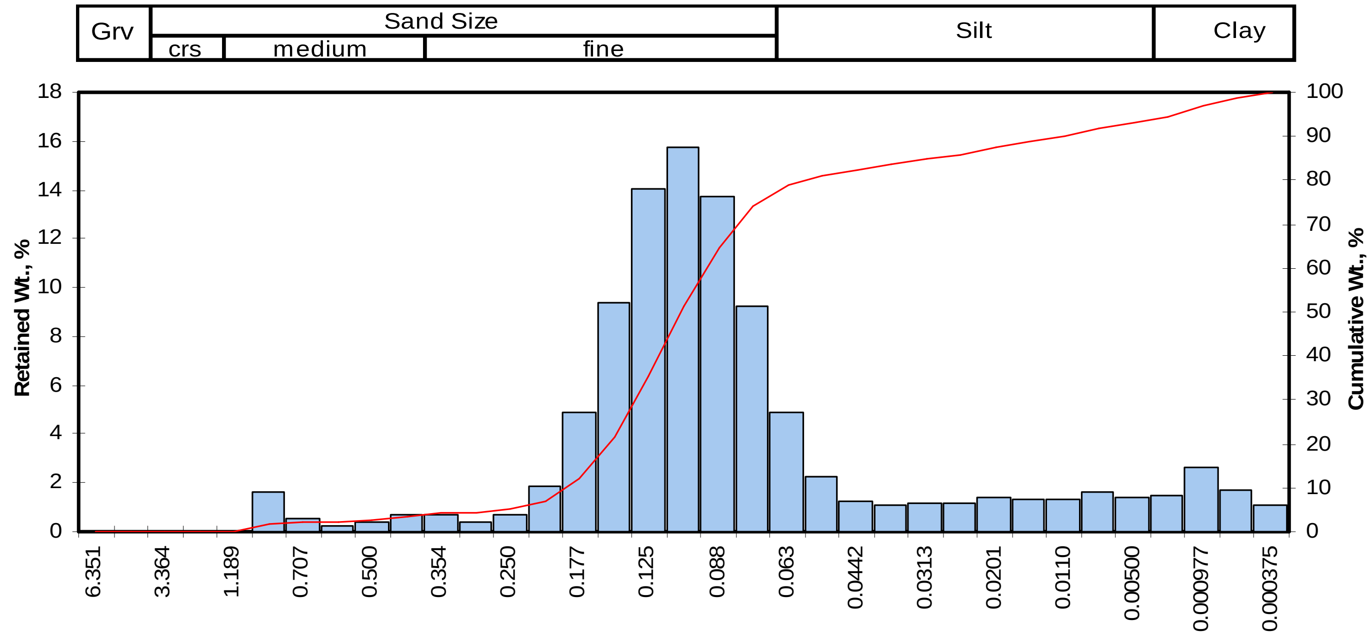
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	78.38
Silt	>0.005 mm	14.80
Clay	<0.005 mm	6.83
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-21 (10.7-11.2) #21
Project No:	C0552-2017-200	**Depth, ft:**	10.7-10.9



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	1.59	1.59	1.59
0.0278	0.707	0.50	25	0.53	0.53	2.12
0.0234	0.595	0.75	30	0.21	0.21	2.33
0.0197	0.500	1.00	35	0.42	0.42	2.75
0.0166	0.420	1.25	40	0.72	0.72	3.47
0.0139	0.354	1.50	45	0.67	0.67	4.14
0.0117	0.297	1.75	50	0.38	0.38	4.52
0.0098	0.250	2.00	60	0.68	0.68	5.21
0.0083	0.210	2.25	70	1.89	1.89	7.10
0.0070	0.177	2.50	80	4.92	4.92	12.02
0.0059	0.149	2.75	100	9.39	9.40	21.42
0.0049	0.125	3.00	120	14.00	14.01	35.44
0.0041	0.105	3.25	140	15.70	15.72	51.15
0.0035	0.088	3.50	170	13.70	13.71	64.86
0.0029	0.074	3.75	200	9.22	9.23	74.09
0.0025	0.063	4.00	230	4.88	4.88	78.98
0.0021	0.053	4.25	270	2.23	2.23	81.21
0.00174	0.0442	4.50	325	1.24	1.24	82.45
0.00146	0.0372	4.75	400	1.11	1.11	83.56
0.00123	0.0313	5.00	450	1.15	1.15	84.71
0.000986	0.0250	5.32	500	1.15	1.15	85.87
0.000790	0.0201	5.64	635	1.42	1.42	87.29
0.000615	0.0156	6.00		1.34	1.34	88.63
0.000435	0.0110	6.50		1.35	1.35	89.98
0.000308	0.00781	7.00		1.65	1.65	91.63
0.000197	0.00500	7.65		1.41	1.41	93.04
0.000077	0.00195	9.00		1.51	1.51	94.55
0.000038	0.000977	10.00		2.61	2.61	97.17
0.000019	0.000488	11.00		1.74	1.74	98.91
0.000015	0.000375	11.38		1.09	1.09	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.92	0.0104	0.263
10	2.40	0.0075	0.190
16	2.61	0.0065	0.164
25	2.81	0.0056	0.142
40	3.07	0.0047	0.119
50	3.23	0.0042	0.106
60	3.41	0.0037	0.094
75	3.80	0.0028	0.072
84	4.84	0.0014	0.035
90	6.51	0.0004	0.011
95	9.17	0.0001	0.002

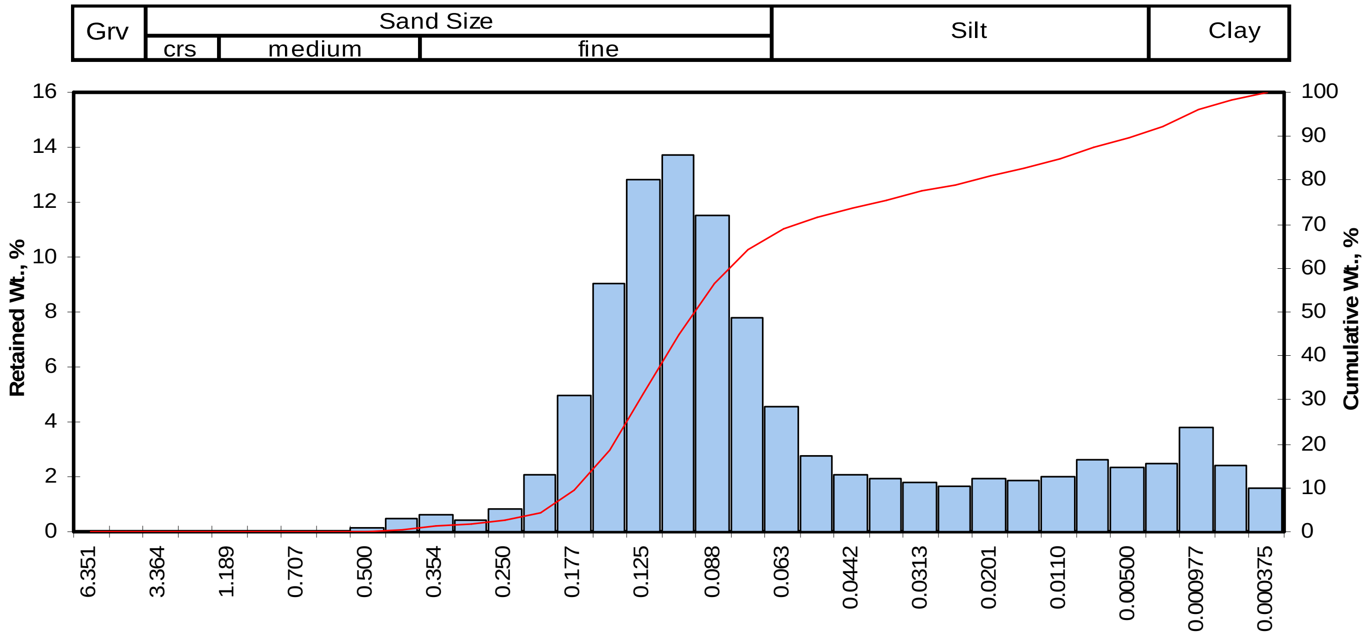
Measure	Trask	Inman	Folk-Ward
Median, phi	3.23	3.23	3.23
Median, in.	0.0042	0.0042	0.0042
Median, mm	0.106	0.106	0.106
Mean, phi	3.22	3.73	3.56
Mean, in.	0.0042	0.0030	0.0033
Mean, mm	0.107	0.076	0.085
Sorting	1.406	1.119	1.658
Skewness	0.950	0.441	0.540
Kurtosis	0.196	2.236	3.022

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	3.47
Fine Sand	200	70.62
Silt	>0.005 mm	18.95
Clay	<0.005 mm	6.96
	Total	**100**

PTS Laboratories, Inc. — **Particle Size Analysis - ASTM D4464M**

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-21 (11.2-11.7) #22
Project No:	C0552-2017-200	**Depth, ft:**	11.2-11.4



Particle Size, mm

Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.01	0.01	0.01
0.0197	0.500	1.00	35	0.12	0.12	0.13
0.0166	0.420	1.25	40	0.51	0.51	0.64
0.0139	0.354	1.50	45	0.60	0.60	1.24
0.0117	0.297	1.75	50	0.39	0.39	1.63
0.0098	0.250	2.00	60	0.80	0.80	2.43
0.0083	0.210	2.25	70	2.07	2.07	4.50
0.0070	0.177	2.50	80	4.97	4.97	9.47
0.0059	0.149	2.75	100	9.00	9.01	18.48
0.0049	0.125	3.00	120	12.80	12.81	31.29
0.0041	0.105	3.25	140	13.70	13.71	44.99
0.0035	0.088	3.50	170	11.50	11.51	56.50
0.0029	0.074	3.75	200	7.77	7.78	64.28
0.0025	0.063	4.00	230	4.57	4.57	68.85
0.0021	0.053	4.25	270	2.77	2.77	71.62
0.00174	0.0442	4.50	325	2.09	2.09	73.71
0.00146	0.0372	4.75	400	1.90	1.90	75.61
0.00123	0.0313	5.00	450	1.77	1.77	77.39
0.000986	0.0250	5.32	500	1.64	1.64	79.03
0.000790	0.0201	5.64	635	1.95	1.95	80.98
0.000615	0.0156	6.00		1.84	1.84	82.82
0.000435	0.0110	6.50		1.97	1.97	84.79
0.000308	0.00781	7.00		2.62	2.62	87.41
0.000197	0.00500	7.65		2.34	2.34	89.75
0.000077	0.00195	9.00		2.48	2.48	92.23
0.000038	0.000977	10.00		3.82	3.82	96.06
0.000019	0.000488	11.00		2.38	2.38	98.44
0.000015	0.000375	11.38		1.56	1.56	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.28	0.0081	0.207
10	2.51	0.0069	0.175
16	2.68	0.0061	0.156
25	2.88	0.0054	0.136
40	3.16	0.0044	0.112
50	3.36	0.0038	0.097
60	3.61	0.0032	0.082
75	4.67	0.0015	0.039
84	6.30	0.0005	0.013
90	7.78	0.0002	0.005
95	9.72	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.36	3.36	3.36
Median, in.	0.0038	0.0038	0.0038
Median, mm	0.097	0.097	0.097
Mean, phi	3.51	4.49	4.11
Mean, in.	0.0035	0.0018	0.0023
Mean, mm	0.088	0.044	0.058
Sorting	1.861	1.809	2.033
Skewness	0.750	0.626	0.667
Kurtosis	0.284	1.058	1.703

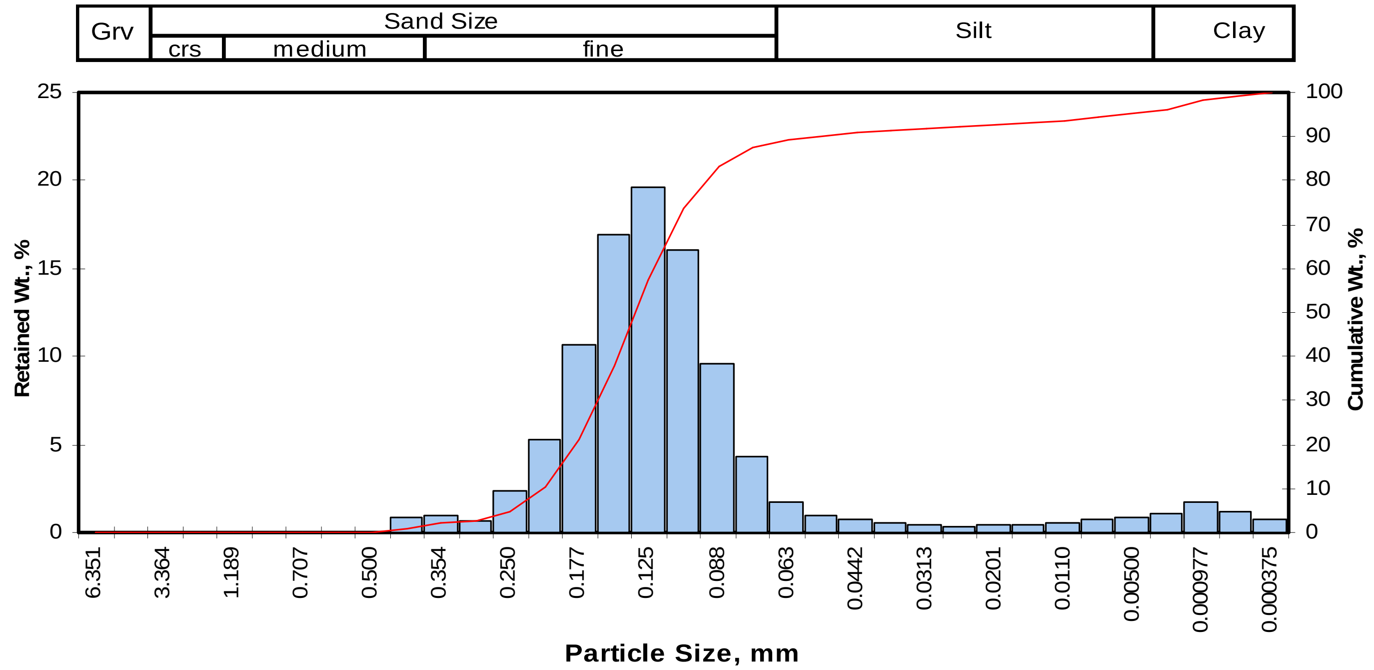
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.64
Fine Sand	200	63.64
Silt	>0.005 mm	25.48
Clay	<0.005 mm	10.25
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-21 (14.0-14.6) #23
Project No:	C0552-2017-200	**Depth, ft:**	14.0-14.6



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.05	0.05	0.05
0.0166	0.420	1.25	40	0.89	0.89	0.94
0.0139	0.354	1.50	45	1.01	1.01	1.95
0.0117	0.297	1.75	50	0.65	0.65	2.60
0.0098	0.250	2.00	60	2.32	2.32	4.92
0.0083	0.210	2.25	70	5.30	5.30	10.22
0.0070	0.177	2.50	80	10.70	10.70	20.92
0.0059	0.149	2.75	100	16.90	16.91	37.83
0.0049	0.125	3.00	120	19.60	19.61	57.44
0.0041	0.105	3.25	140	16.10	16.11	73.54
0.0035	0.088	3.50	170	9.56	9.56	83.10
0.0029	0.074	3.75	200	4.29	4.29	87.40
0.0025	0.063	4.00	230	1.67	1.67	89.07
0.0021	0.053	4.25	270	0.98	0.98	90.05
0.00174	0.0442	4.50	325	0.78	0.78	90.83
0.00146	0.0372	4.75	400	0.55	0.55	91.38
0.00123	0.0313	5.00	450	0.40	0.40	91.78
0.000986	0.0250	5.32	500	0.35	0.35	92.13
0.000790	0.0201	5.64	635	0.44	0.44	92.57
0.000615	0.0156	6.00		0.47	0.47	93.04
0.000435	0.0110	6.50		0.51	0.51	93.55
0.000308	0.00781	7.00		0.79	0.79	94.34
0.000197	0.00500	7.65		0.91	0.91	95.25
0.000077	0.00195	9.00		1.08	1.08	96.33
0.000038	0.000977	10.00		1.76	1.76	98.09
0.000019	0.000488	11.00		1.17	1.17	99.26
0.000015	0.000375	11.38		0.74	0.74	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.00	0.0098	0.249
10	2.24	0.0083	0.212
16	2.38	0.0075	0.191
25	2.56	0.0067	0.170
40	2.78	0.0057	0.146
50	2.91	0.0053	0.133
60	3.04	0.0048	0.122
75	3.29	0.0040	0.102
84	3.55	0.0034	0.085
90	4.24	0.0021	0.053
95	7.47	0.0002	0.006

Measure	Trask	Inman	Folk-Ward
Median, phi	2.91	2.91	2.91
Median, in.	0.0053	0.0053	0.0053
Median, mm	0.133	0.133	0.133
Mean, phi	2.88	2.97	2.95
Mean, in.	0.0054	0.0050	0.0051
Mean, mm	0.136	0.128	0.130
Sorting	1.287	0.584	1.120
Skewness	0.987	0.109	0.389
Kurtosis	0.212	3.682	3.077

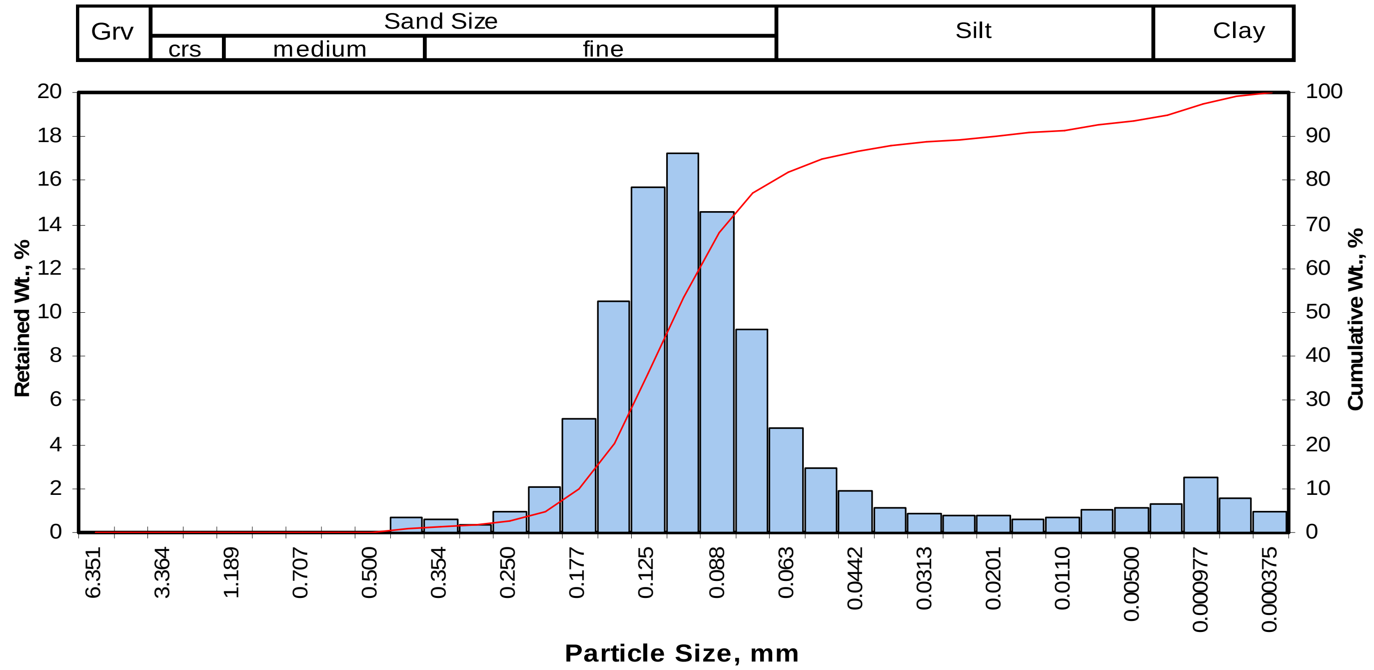
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.94
Fine Sand	200	86.46
Silt	>0.005 mm	7.85
Clay	<0.005 mm	4.75
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-21 (16.9-17.3) #24
Project No:	C05552_2017-200	**Depth, ft:**	17.1-17.3



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.03	0.03	0.03
0.0166	0.420	1.25	40	0.73	0.73	0.76
0.0139	0.354	1.50	45	0.57	0.57	1.33
0.0117	0.297	1.75	50	0.31	0.31	1.64
0.0098	0.250	2.00	60	0.97	0.97	2.61
0.0083	0.210	2.25	70	2.06	2.06	4.67
0.0070	0.177	2.50	80	5.21	5.21	9.88
0.0059	0.149	2.75	100	10.50	10.50	20.38
0.0049	0.125	3.00	120	15.70	15.71	36.09
0.0041	0.105	3.25	140	17.20	17.21	53.30
0.0035	0.088	3.50	170	14.60	14.61	67.91
0.0029	0.074	3.75	200	9.25	9.25	77.16
0.0025	0.063	4.00	230	4.76	4.76	81.92
0.0021	0.053	4.25	270	2.92	2.92	84.84
0.00174	0.0442	4.50	325	1.91	1.91	86.75
0.00146	0.0372	4.75	400	1.08	1.08	87.83
0.00123	0.0313	5.00	450	0.84	0.84	88.68
0.000986	0.0250	5.32	500	0.76	0.76	89.44
0.000790	0.0201	5.64	635	0.77	0.77	90.21
0.000615	0.0156	6.00		0.64	0.64	90.85
0.000435	0.0110	6.50		0.69	0.69	91.54
0.000308	0.00781	7.00		1.04	1.04	92.58
0.000197	0.00500	7.65		1.09	1.09	93.67
0.000077	0.00195	9.00		1.32	1.32	94.99
0.000038	0.000977	10.00		2.47	2.47	97.46
0.000019	0.000488	11.00		1.55	1.55	99.01
0.000015	0.000375	11.38		0.99	0.99	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.27	0.0082	0.208
10	2.50	0.0069	0.176
16	2.65	0.0063	0.160
25	2.82	0.0056	0.141
40	3.06	0.0047	0.120
50	3.20	0.0043	0.109
60	3.36	0.0038	0.097
75	3.69	0.0030	0.077
84	4.18	0.0022	0.055
90	5.55	0.0008	0.021
95	9.00	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.20	3.20	3.20
Median, in.	0.0043	0.0043	0.0043
Median, mm	0.109	0.109	0.109
Mean, phi	3.19	3.41	3.34
Mean, in.	0.0043	0.0037	0.0039
Mean, mm	0.109	0.094	0.099
Sorting	1.351	0.766	1.404
Skewness	0.962	0.274	0.498
Kurtosis	0.206	3.398	3.181

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

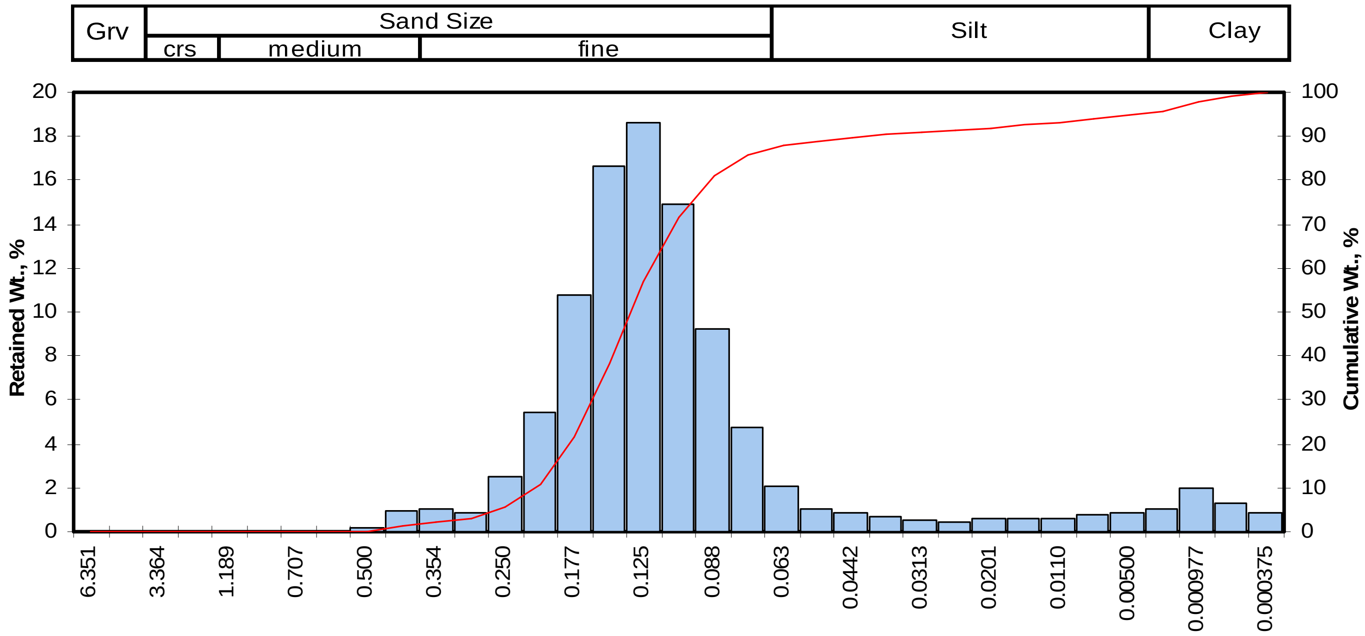
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.76
Fine Sand	200	76.40
Silt	>0.005 mm	16.51
Clay	<0.005 mm	6.33
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C0552-2017-200

PTS File No: 47478
Sample ID: DP-22 (11.3-12.0) #26
Depth, ft: 11.8-12.0



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.13	0.13	0.13
0.0166	0.420	1.25	40	0.95	0.95	1.08
0.0139	0.354	1.50	45	1.07	1.07	2.15
0.0117	0.297	1.75	50	0.83	0.83	2.98
0.0098	0.250	2.00	60	2.46	2.46	5.44
0.0083	0.210	2.25	70	5.41	5.41	10.85
0.0070	0.177	2.50	80	10.80	10.80	21.66
0.0059	0.149	2.75	100	16.60	16.60	38.26
0.0049	0.125	3.00	120	18.60	18.60	56.86
0.0041	0.105	3.25	140	14.90	14.90	71.76
0.0035	0.088	3.50	170	9.26	9.26	81.03
0.0029	0.074	3.75	200	4.75	4.75	85.78
0.0025	0.063	4.00	230	2.06	2.06	87.84
0.0021	0.053	4.25	270	1.00	1.00	88.84
0.00174	0.0442	4.50	325	0.84	0.84	89.68
0.00146	0.0372	4.75	400	0.71	0.71	90.39
0.00123	0.0313	5.00	450	0.49	0.49	90.88
0.000986	0.0250	5.32	500	0.44	0.44	91.32
0.000790	0.0201	5.64	635	0.63	0.63	91.95
0.000615	0.0156	6.00		0.62	0.62	92.57
0.000435	0.0110	6.50		0.61	0.61	93.18
0.000308	0.00781	7.00		0.81	0.81	93.99
0.000197	0.00500	7.65		0.84	0.84	94.83
0.000077	0.00195	9.00		1.04	1.04	95.87
0.000038	0.000977	10.00		1.98	1.98	97.85
0.000019	0.000488	11.00		1.30	1.30	99.15
0.000015	0.000375	11.38		0.85	0.85	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.96	0.0102	0.258
10	2.21	0.0085	0.216
16	2.37	0.0076	0.194
25	2.55	0.0067	0.171
40	2.77	0.0058	0.146
50	2.91	0.0052	0.133
60	3.05	0.0047	0.121
75	3.34	0.0039	0.099
84	3.66	0.0031	0.079
90	4.61	0.0016	0.041
95	7.87	0.0002	0.004

Measure	Trask	Inman	Folk-Ward
Median, phi	2.91	2.91	2.91
Median, in.	0.0052	0.0052	0.0052
Median, mm	0.133	0.133	0.133
Mean, phi	2.89	3.01	2.98
Mean, in.	0.0053	0.0049	0.0050
Mean, mm	0.135	0.124	0.127
Sorting	1.314	0.644	1.218
Skewness	0.975	0.163	0.420
Kurtosis	0.205	3.593	3.079

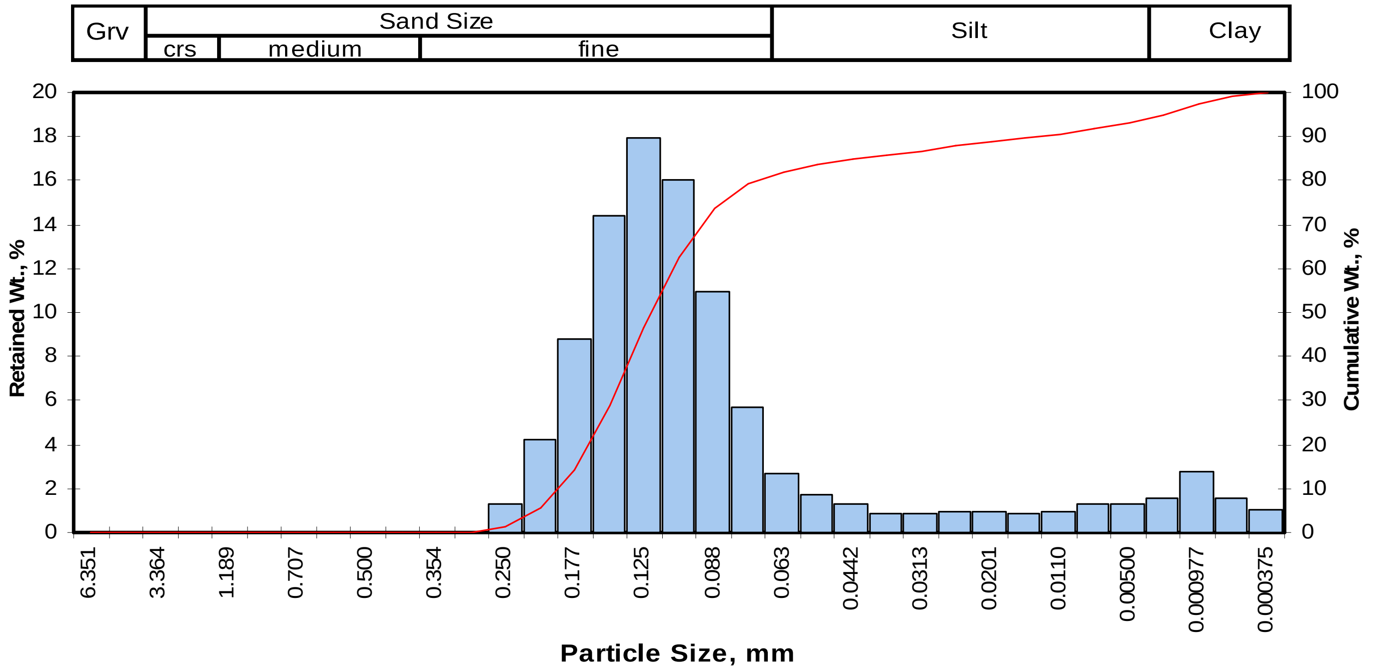
Grain Size Description (ASTM-USCS Scale): Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.08
Fine Sand	200	84.70
Silt	>0.005 mm	9.05
Clay	<0.005 mm	5.17
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-22 (13.5-14.2) #27
Project No:	C0552-2017-200	**Depth, ft:**	13.5-13.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.04	0.04	0.04
0.0098	0.250	2.00	60	1.29	1.29	1.33
0.0083	0.210	2.25	70	4.21	4.22	5.55
0.0070	0.177	2.50	80	8.77	8.78	14.33
0.0059	0.149	2.75	100	14.40	14.42	28.75
0.0049	0.125	3.00	120	17.90	17.93	46.68
0.0041	0.105	3.25	140	16.00	16.02	62.70
0.0035	0.088	3.50	170	10.90	10.92	73.62
0.0029	0.074	3.75	200	5.70	5.71	79.33
0.0025	0.063	4.00	230	2.70	2.70	82.03
0.0021	0.053	4.25	270	1.75	1.75	83.79
0.00174	0.0442	4.50	325	1.28	1.28	85.07
0.00146	0.0372	4.75	400	0.87	0.87	85.94
0.00123	0.0313	5.00	450	0.90	0.90	86.84
0.000986	0.0250	5.32	500	0.93	0.93	87.77
0.000790	0.0201	5.64	635	0.94	0.94	88.71
0.000615	0.0156	6.00		0.83	0.83	89.54
0.000435	0.0110	6.50		0.95	0.95	90.50
0.000308	0.00781	7.00		1.29	1.29	91.79
0.000197	0.00500	7.65		1.29	1.29	93.08
0.000077	0.00195	9.00		1.58	1.58	94.66
0.000038	0.000977	10.00		2.75	2.75	97.42
0.000019	0.000488	11.00		1.57	1.57	98.99
0.000015	0.000375	11.38		1.01	1.01	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.22	0.0085	0.215
10	2.38	0.0076	0.193
16	2.53	0.0068	0.173
25	2.68	0.0061	0.156
40	2.91	0.0052	0.133
50	3.05	0.0047	0.121
60	3.21	0.0043	0.108
75	3.56	0.0033	0.085
84	4.29	0.0020	0.051
90	6.24	0.0005	0.013
95	9.12	0.0001	0.002

Measure	Trask	Inman	Folk-Ward
Median, phi	3.05	3.05	3.05
Median, in.	0.0047	0.0047	0.0047
Median, mm	0.121	0.121	0.121
Mean, phi	3.06	3.41	3.29
Mean, in.	0.0047	0.0037	0.0040
Mean, mm	0.120	0.094	0.102
Sorting	1.354	0.881	1.487
Skewness	0.952	0.407	0.583
Kurtosis	0.197	2.917	3.233

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

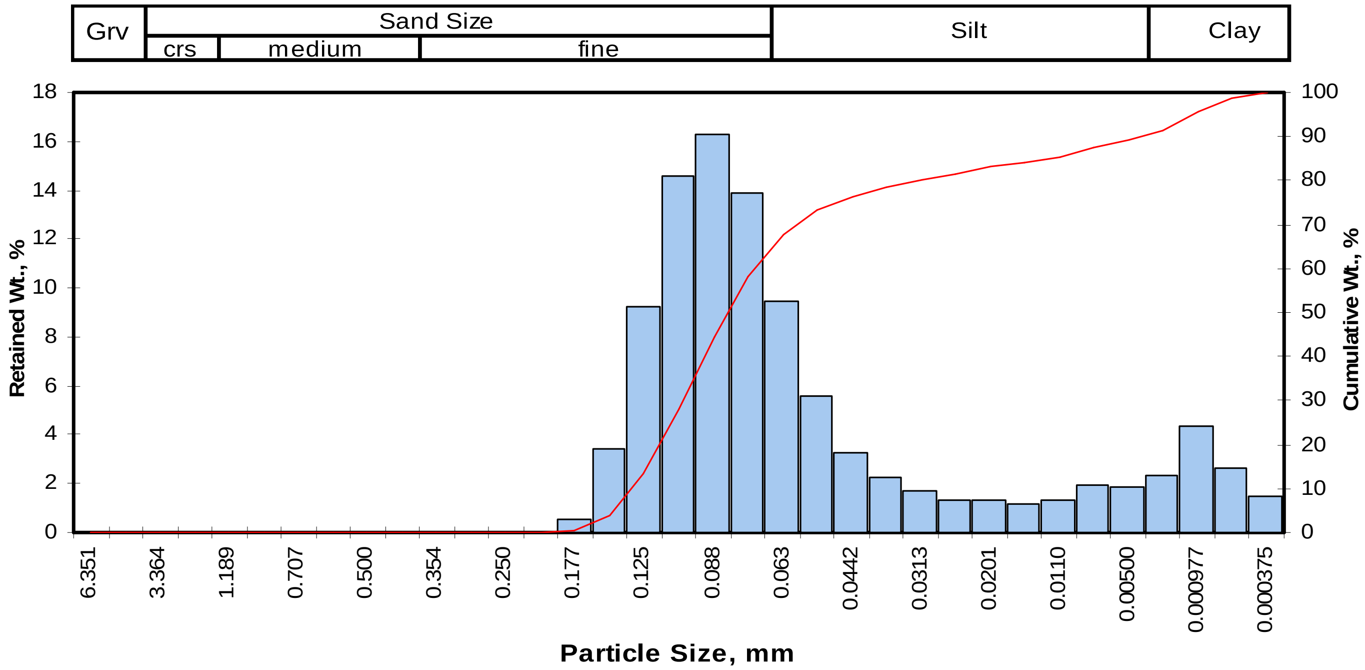
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	79.33
Silt	>0.005 mm	13.75
Clay	<0.005 mm	6.92
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-22 (17.7-18.3) #28
Project No:	C0552-2017-200	**Depth, ft:**	17.7-17.9



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.00	0.00	0.00
0.0083	0.210	2.25	70	0.02	0.02	0.02
0.0070	0.177	2.50	80	0.58	0.58	0.60
0.0059	0.149	2.75	100	3.41	3.41	4.02
0.0049	0.125	3.00	120	9.21	9.22	13.24
0.0041	0.105	3.25	140	14.60	14.62	27.86
0.0035	0.088	3.50	170	16.30	16.32	44.18
0.0029	0.074	3.75	200	13.90	13.92	58.10
0.0025	0.063	4.00	230	9.45	9.46	67.57
0.0021	0.053	4.25	270	5.54	5.55	73.11
0.00174	0.0442	4.50	325	3.27	3.27	76.39
0.00146	0.0372	4.75	400	2.23	2.23	78.62
0.00123	0.0313	5.00	450	1.70	1.70	80.32
0.000986	0.0250	5.32	500	1.32	1.32	81.64
0.000790	0.0201	5.64	635	1.34	1.34	82.99
0.000615	0.0156	6.00		1.18	1.18	84.17
0.000435	0.0110	6.50		1.32	1.32	85.49
0.000308	0.00781	7.00		1.91	1.91	87.40
0.000197	0.00500	7.65		1.89	1.89	89.30
0.000077	0.00195	9.00		2.29	2.29	91.59
0.000038	0.000977	10.00		4.31	4.32	95.90
0.000019	0.000488	11.00		2.60	2.60	98.51
0.000015	0.000375	11.38		1.49	1.49	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.78	0.0057	0.146
10	2.91	0.0052	0.133
16	3.05	0.0048	0.121
25	3.20	0.0043	0.109
40	3.44	0.0036	0.092
50	3.60	0.0032	0.082
60	3.80	0.0028	0.072
75	4.39	0.0019	0.048
84	5.95	0.0006	0.016
90	8.06	0.0001	0.004
95	9.79	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.60	3.60	3.60
Median, in.	0.0032	0.0032	0.0032
Median, mm	0.082	0.082	0.082
Mean, phi	3.68	4.50	4.20
Mean, in.	0.0031	0.0017	0.0021
Mean, mm	0.078	0.044	0.054
Sorting	1.512	1.451	1.788
Skewness	0.875	0.616	0.690
Kurtosis	0.237	1.417	2.410

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

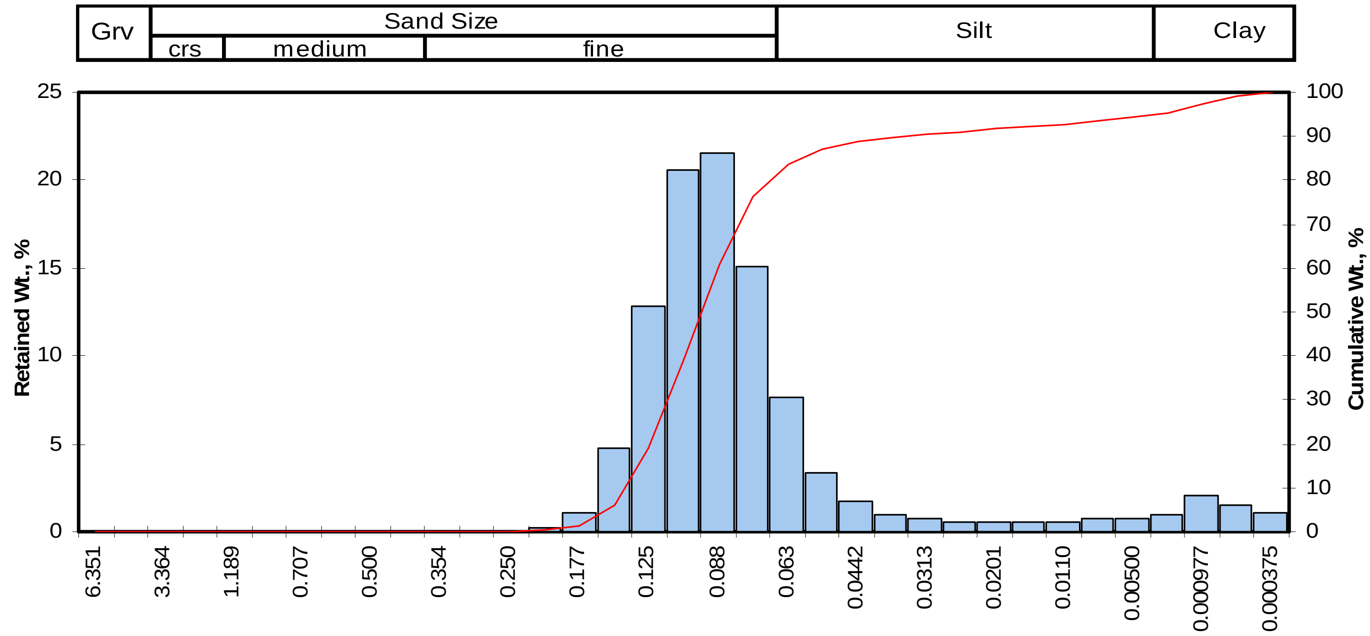
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	58.10
Silt	>0.005 mm	31.19
Clay	<0.005 mm	10.70
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-22 (20.5-21.0) #29
Project No:	C05552_2017-200	**Depth, ft:**	20.5-21.0



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.04	0.04	0.04
0.0083	0.210	2.25	70	0.25	0.25	0.29
0.0070	0.177	2.50	80	1.04	1.04	1.33
0.0059	0.149	2.75	100	4.72	4.73	6.06
0.0049	0.125	3.00	120	12.80	12.82	18.88
0.0041	0.105	3.25	140	20.50	20.54	39.42
0.0035	0.088	3.50	170	21.50	21.54	60.96
0.0029	0.074	3.75	200	15.10	15.13	76.09
0.0025	0.063	4.00	230	7.66	7.67	83.76
0.0021	0.053	4.25	270	3.36	3.37	87.13
0.00174	0.0442	4.50	325	1.69	1.69	88.82
0.00146	0.0372	4.75	400	1.02	1.02	89.84
0.00123	0.0313	5.00	450	0.72	0.72	90.56
0.000986	0.0250	5.32	500	0.55	0.55	91.11
0.000790	0.0201	5.64	635	0.56	0.56	91.68
0.000615	0.0156	6.00		0.52	0.52	92.20
0.000435	0.0110	6.50		0.58	0.58	92.78
0.000308	0.00781	7.00		0.80	0.80	93.58
0.000197	0.00500	7.65		0.80	0.80	94.38
0.000077	0.00195	9.00		1.00	1.00	95.38
0.000038	0.000977	10.00		2.03	2.03	97.42
0.000019	0.000488	11.00		1.53	1.53	98.95
0.000015	0.000375	11.38		1.05	1.05	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.69	0.0061	0.155
10	2.83	0.0055	0.141
16	2.94	0.0051	0.130
25	3.07	0.0047	0.119
40	3.26	0.0041	0.105
50	3.37	0.0038	0.097
60	3.49	0.0035	0.089
75	3.73	0.0030	0.075
84	4.02	0.0024	0.062
90	4.80	0.0014	0.036
95	8.48	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	3.37	3.37	3.37
Median, in.	0.0038	0.0038	0.0038
Median, mm	0.097	0.097	0.097
Mean, phi	3.37	3.48	3.44
Mean, in.	0.0038	0.0035	0.0036
Mean, mm	0.097	0.090	0.092
Sorting	1.256	0.537	1.146
Skewness	0.979	0.201	0.483
Kurtosis	0.207	4.391	3.608

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	76.09
Silt	>0.005 mm	18.29
Clay	<0.005 mm	5.62
	Total	**100**

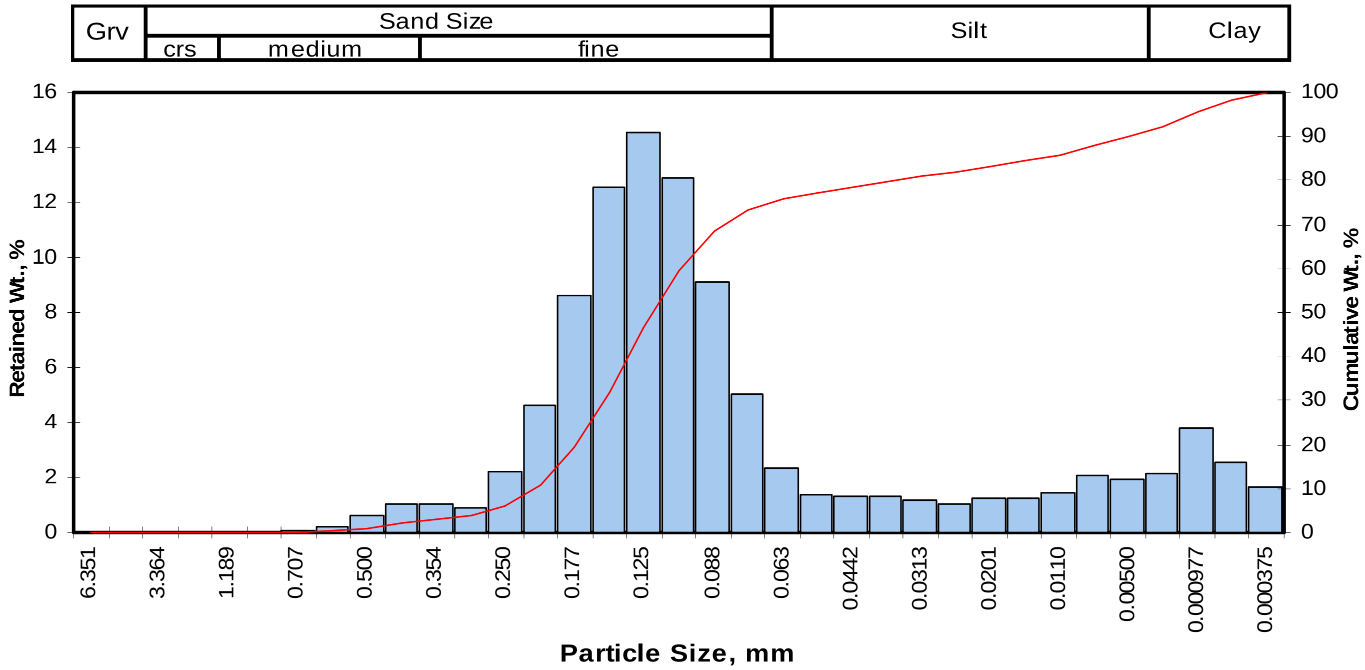
Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C0552-2017-200

PTS File No: 47478
Sample ID: DP-23 (11.0-11.7) #30
Depth, ft: 11.0-11.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.05	0.05	0.05
0.0234	0.595	0.75	30	0.23	0.23	0.28
0.0197	0.500	1.00	35	0.64	0.64	0.92
0.0166	0.420	1.25	40	1.06	1.06	1.98
0.0139	0.354	1.50	45	1.06	1.06	3.04
0.0117	0.297	1.75	50	0.87	0.87	3.92
0.0098	0.250	2.00	60	2.20	2.20	6.12
0.0083	0.210	2.25	70	4.58	4.59	10.71
0.0070	0.177	2.50	80	8.62	8.64	19.35
0.0059	0.149	2.75	100	12.50	12.53	31.88
0.0049	0.125	3.00	120	14.50	14.53	46.41
0.0041	0.105	3.25	140	12.90	12.93	59.33
0.0035	0.088	3.50	170	9.07	9.09	68.42
0.0029	0.074	3.75	200	5.00	5.01	73.43
0.0025	0.063	4.00	230	2.37	2.38	75.81
0.0021	0.053	4.25	270	1.39	1.39	77.20
0.00174	0.0442	4.50	325	1.29	1.29	78.49
0.00146	0.0372	4.75	400	1.31	1.31	79.81
0.00123	0.0313	5.00	450	1.17	1.17	80.98
0.000986	0.0250	5.32	500	1.03	1.03	82.01
0.000790	0.0201	5.64	635	1.22	1.22	83.23
0.000615	0.0156	6.00		1.26	1.26	84.50
0.000435	0.0110	6.50		1.47	1.47	85.97
0.000308	0.00781	7.00		2.06	2.06	88.03
0.000197	0.00500	7.65		1.90	1.90	89.94
0.000077	0.00195	9.00		2.13	2.13	92.07
0.000038	0.000977	10.00		3.76	3.77	95.84
0.000019	0.000488	11.00		2.53	2.54	98.38
0.000015	0.000375	11.38		1.62	1.62	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.87	0.0107	0.273
10	2.21	0.0085	0.216
16	2.40	0.0074	0.189
25	2.61	0.0064	0.163
40	2.89	0.0053	0.135
50	3.07	0.0047	0.119
60	3.27	0.0041	0.104
75	3.91	0.0026	0.066
84	5.86	0.0007	0.017
90	7.68	0.0002	0.005
95	9.78	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.07	3.07	3.07
Median, in.	0.0047	0.0047	0.0047
Median, mm	0.119	0.119	0.119
Mean, phi	3.12	4.13	3.78
Mean, in.	0.0045	0.0022	0.0029
Mean, mm	0.115	0.057	0.073
Sorting	1.570	1.728	2.061
Skewness	0.874	0.614	0.656
Kurtosis	0.230	1.288	2.488

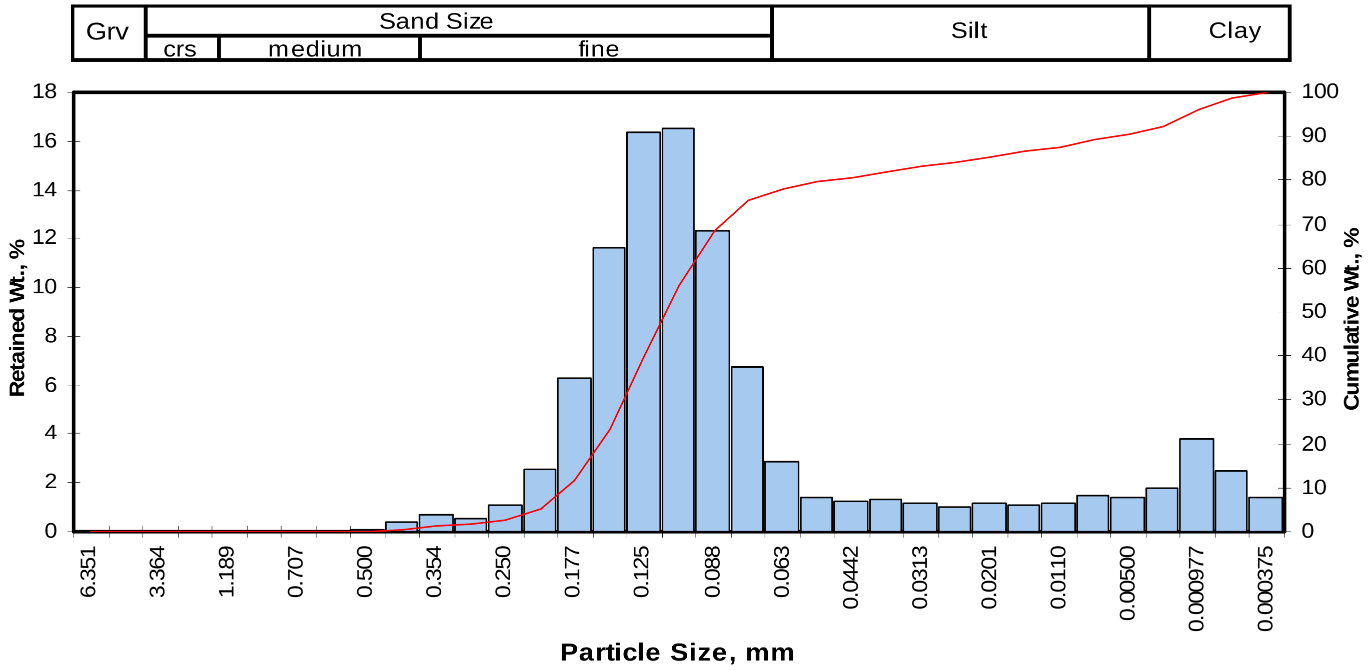
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	1.98
Fine Sand	200	71.45
Silt	>0.005 mm	16.50
Clay	<0.005 mm	10.06
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-23 (14.0-14.7) #31
Project No:	C05552_2017-200	**Depth, ft:**	14.0-14.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.05	0.05	0.05
0.0166	0.420	1.25	40	0.37	0.37	0.42
0.0139	0.354	1.50	45	0.67	0.67	1.09
0.0117	0.297	1.75	50	0.57	0.57	1.67
0.0098	0.250	2.00	60	1.11	1.11	2.78
0.0083	0.210	2.25	70	2.59	2.60	5.38
0.0070	0.177	2.50	80	6.30	6.32	11.69
0.0059	0.149	2.75	100	11.60	11.63	23.32
0.0049	0.125	3.00	120	16.30	16.34	39.66
0.0041	0.105	3.25	140	16.50	16.54	56.21
0.0035	0.088	3.50	170	12.30	12.33	68.54
0.0029	0.074	3.75	200	6.76	6.78	75.32
0.0025	0.063	4.00	230	2.89	2.90	78.21
0.0021	0.053	4.25	270	1.38	1.38	79.60
0.00174	0.0442	4.50	325	1.21	1.21	80.81
0.00146	0.0372	4.75	400	1.29	1.29	82.10
0.00123	0.0313	5.00	450	1.15	1.15	83.26
0.000986	0.0250	5.32	500	0.98	0.98	84.24
0.000790	0.0201	5.64	635	1.13	1.13	85.37
0.000615	0.0156	6.00		1.09	1.09	86.46
0.000435	0.0110	6.50		1.15	1.15	87.62
0.000308	0.00781	7.00		1.48	1.48	89.10
0.000197	0.00500	7.65		1.39	1.39	90.50
0.000077	0.00195	9.00		1.76	1.76	92.26
0.000038	0.000977	10.00		3.80	3.81	96.07
0.000019	0.000488	11.00		2.49	2.50	98.57
0.000015	0.000375	11.38		1.43	1.43	100.00
TOTALS				**99.70**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.21	0.0085	0.216
10	2.43	0.0073	0.185
16	2.59	0.0065	0.166
25	2.78	0.0057	0.146
40	3.01	0.0049	0.125
50	3.16	0.0044	0.112
60	3.33	0.0039	0.100
75	3.74	0.0029	0.075
84	5.24	0.0010	0.026
90	7.42	0.0002	0.006
95	9.72	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.16	3.16	3.16
Median, in.	0.0044	0.0044	0.0044
Median, mm	0.112	0.112	0.112
Mean, phi	3.18	3.92	3.66
Mean, in.	0.0043	0.0026	0.0031
Mean, mm	0.110	0.066	0.079
Sorting	1.396	1.325	1.800
Skewness	0.933	0.575	0.662
Kurtosis	0.198	1.833	3.195

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

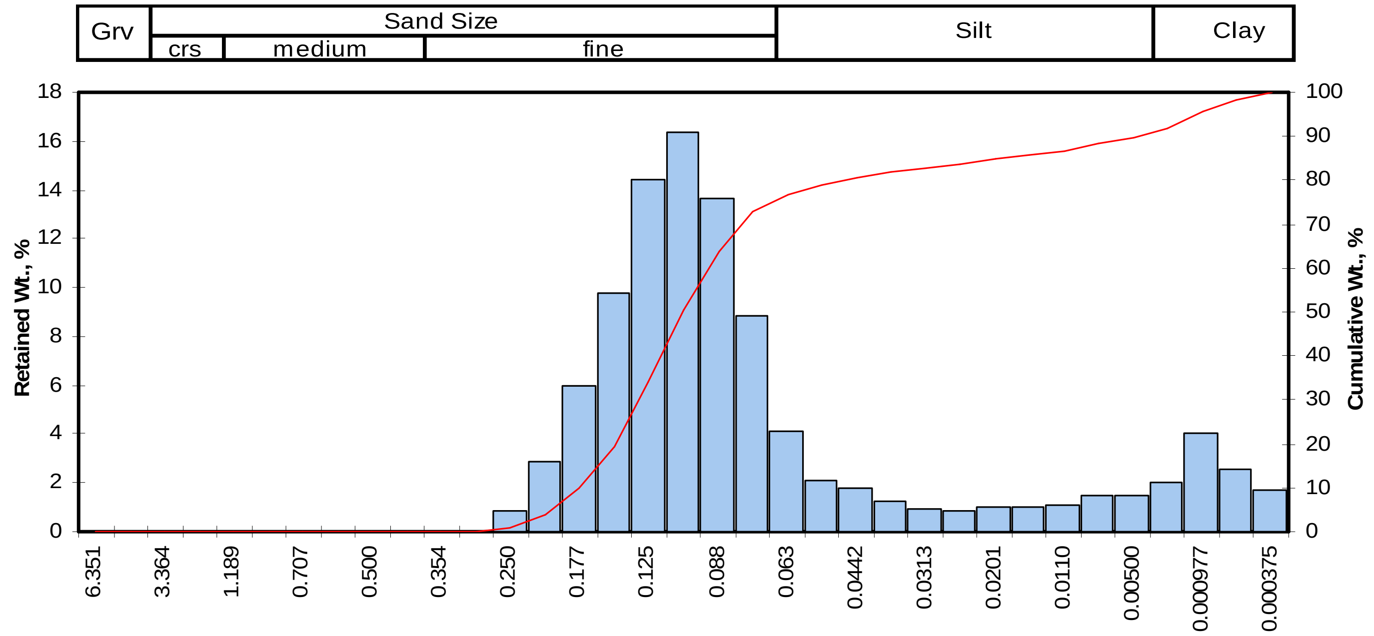
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.42
Fine Sand	200	74.89
Silt	>0.005 mm	15.18
Clay	<0.005 mm	9.50
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

PTS File No: 47478
Sample ID: DP-23 (16.0-16.7) #32
Depth, ft: 16.0-16.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.03	0.03	0.03
0.0098	0.250	2.00	60	0.89	0.89	0.92
0.0083	0.210	2.25	70	2.88	2.89	3.80
0.0070	0.177	2.50	80	5.94	5.95	9.76
0.0059	0.149	2.75	100	9.73	9.75	19.51
0.0049	0.125	3.00	120	14.40	14.43	33.94
0.0041	0.105	3.25	140	16.30	16.33	50.27
0.0035	0.088	3.50	170	13.60	13.63	63.90
0.0029	0.074	3.75	200	8.86	8.88	72.78
0.0025	0.063	4.00	230	4.11	4.12	76.90
0.0021	0.053	4.25	270	2.11	2.11	79.02
0.00174	0.0442	4.50	325	1.76	1.76	80.78
0.00146	0.0372	4.75	400	1.21	1.21	81.99
0.00123	0.0313	5.00	450	0.90	0.90	82.89
0.000986	0.0250	5.32	500	0.85	0.85	83.75
0.000790	0.0201	5.64	635	1.01	1.01	84.76
0.000615	0.0156	6.00		0.98	0.98	85.74
0.000435	0.0110	6.50		1.08	1.08	86.82
0.000308	0.00781	7.00		1.44	1.44	88.26
0.000197	0.00500	7.65		1.49	1.49	89.76
0.000077	0.00195	9.00		1.98	1.98	91.74
0.000038	0.000977	10.00		4.03	4.04	95.78
0.000019	0.000488	11.00		2.53	2.54	98.32
0.000015	0.000375	11.38		1.68	1.68	100.00
TOTALS				**99.80**	**100.00**	**100.00**

Cumulative Weight Percent greater than: Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.30	0.0080	0.203
10	2.51	0.0069	0.176
16	2.66	0.0062	0.158
25	2.85	0.0055	0.139
40	3.09	0.0046	0.117
50	3.25	0.0042	0.105
60	3.43	0.0037	0.093
75	3.88	0.0027	0.068
84	5.40	0.0009	0.024
90	7.81	0.0002	0.004
95	9.81	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.25	3.25	3.25
Median, in.	0.0042	0.0042	0.0042
Median, mm	0.105	0.105	0.105
Mean, phi	3.27	4.03	3.77
Mean, in.	0.0041	0.0024	0.0029
Mean, mm	0.103	0.061	0.073
Sorting	1.434	1.370	1.822
Skewness	0.921	0.573	0.660
Kurtosis	0.208	1.739	2.960

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

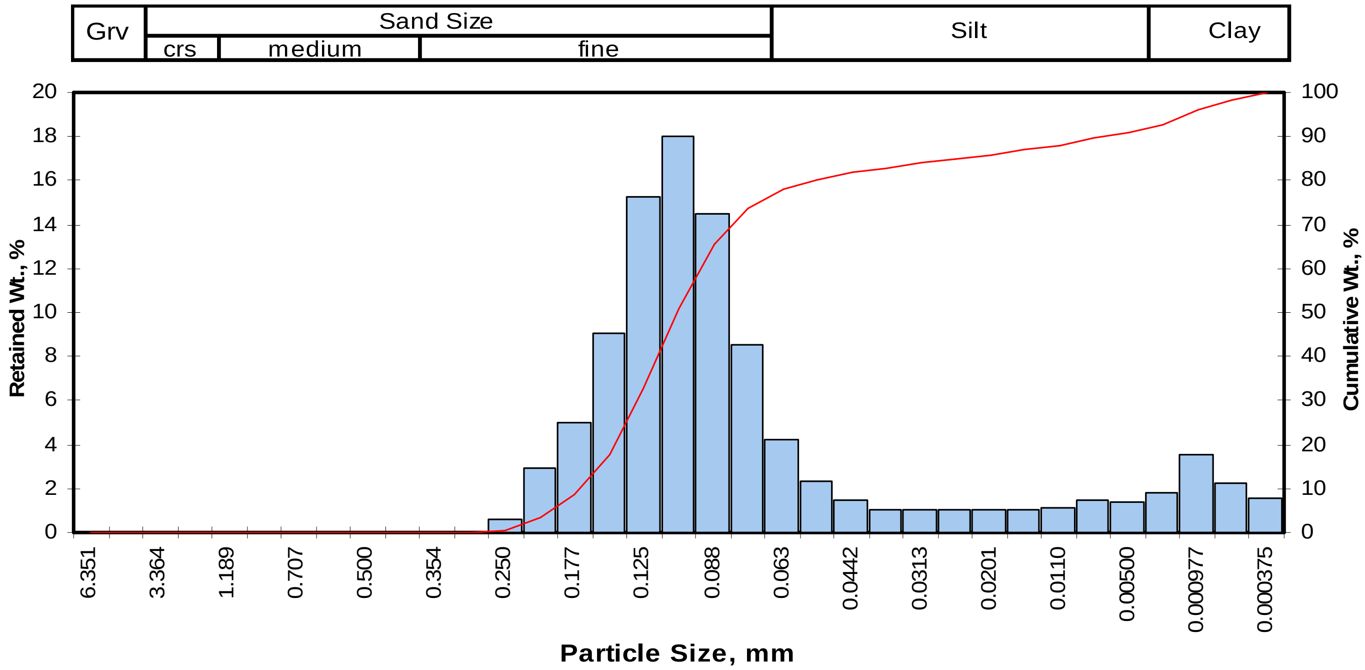
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	72.78
Silt	>0.005 mm	16.98
Clay	<0.005 mm	10.24
	Total	**100**

Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	EHS Support	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-24 (13.5-14.2) #33
Project No:	C05552_2017-200	**Depth, ft:**	13.5-13.7



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.64	0.64	0.64
0.0083	0.210	2.25	70	2.92	2.92	3.57
0.0070	0.177	2.50	80	4.95	4.96	8.52
0.0059	0.149	2.75	100	9.00	9.01	17.54
0.0049	0.125	3.00	120	15.20	15.22	32.76
0.0041	0.105	3.25	140	18.00	18.03	50.79
0.0035	0.088	3.50	170	14.50	14.52	65.31
0.0029	0.074	3.75	200	8.52	8.53	73.84
0.0025	0.063	4.00	230	4.18	4.19	78.03
0.0021	0.053	4.25	270	2.31	2.31	80.34
0.00174	0.0442	4.50	325	1.43	1.43	81.77
0.00146	0.0372	4.75	400	1.03	1.03	82.80
0.00123	0.0313	5.00	450	1.07	1.07	83.88
0.000986	0.0250	5.32	500	1.03	1.03	84.91
0.000790	0.0201	5.64	635	1.06	1.06	85.97
0.000615	0.0156	6.00		0.99	0.99	86.96
0.000435	0.0110	6.50		1.12	1.12	88.08
0.000308	0.00781	7.00		1.44	1.44	89.52
0.000197	0.00500	7.65		1.39	1.39	90.92
0.000077	0.00195	9.00		1.77	1.77	92.69
0.000038	0.000977	10.00		3.55	3.56	96.24
0.000019	0.000488	11.00		2.24	2.24	98.49
0.000015	0.000375	11.38		1.51	1.51	100.00
TOTALS				**99.90**	**100.00**	**100.00**

Cumulative Weight Percent greater than

Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.32	0.0079	0.200
10	2.54	0.0068	0.172
16	2.71	0.0060	0.153
25	2.87	0.0054	0.137
40	3.10	0.0046	0.117
50	3.24	0.0042	0.106
60	3.41	0.0037	0.094
75	3.82	0.0028	0.071
84	5.04	0.0012	0.030
90	7.22	0.0003	0.007
95	9.65	0.0000	0.001

Measure	Trask	Inman	Folk-Ward
Median, phi	3.24	3.24	3.24
Median, in.	0.0042	0.0042	0.0042
Median, mm	0.106	0.106	0.106
Mean, phi	3.27	3.87	3.66
Mean, in.	0.0041	0.0027	0.0031
Mean, mm	0.104	0.068	0.079
Sorting	1.388	1.166	1.693
Skewness	0.929	0.544	0.647
Kurtosis	0.199	2.143	3.172

Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	73.84
Silt	>0.005 mm	17.08
Clay	<0.005 mm	9.08
	Total	**100**

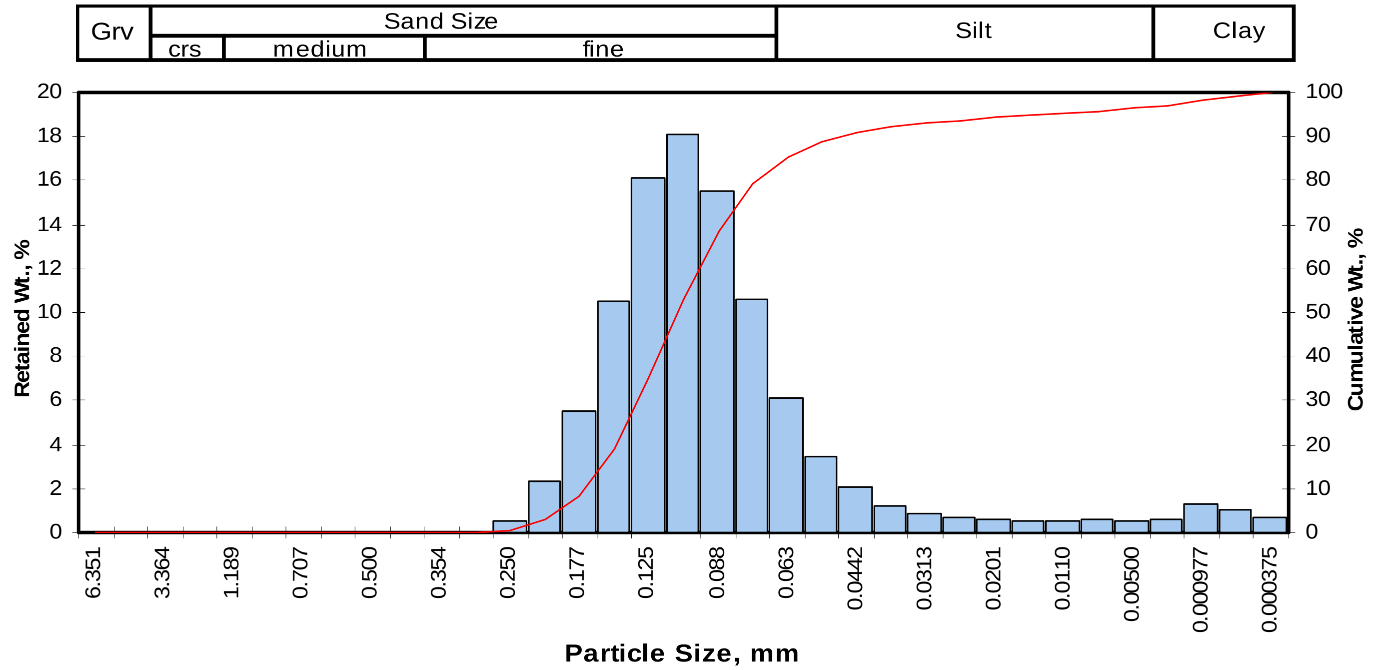
Phone: (562) 907-3607 Fax: (562) 907-3610

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: EHS Support
Project: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

PTS File No: 47478
Sample ID: DP-24 (17.0-17.5) #34
Depth, ft: 17.0-17.2



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.54	0.54	0.54
0.0083	0.210	2.25	70	2.37	2.37	2.91
0.0070	0.177	2.50	80	5.48	5.48	8.39
0.0059	0.149	2.75	100	10.50	10.50	18.89
0.0049	0.125	3.00	120	16.10	16.10	34.99
0.0041	0.105	3.25	140	18.10	18.10	53.08
0.0035	0.088	3.50	170	15.50	15.50	68.58
0.0029	0.074	3.75	200	10.60	10.60	79.18
0.0025	0.063	4.00	230	6.15	6.15	85.32
0.0021	0.053	4.25	270	3.49	3.49	88.81
0.00174	0.0442	4.50	325	2.06	2.06	90.87
0.00146	0.0372	4.75	400	1.25	1.25	92.12
0.00123	0.0313	5.00	450	0.87	0.87	92.99
0.000986	0.0250	5.32	500	0.65	0.65	93.64
0.000790	0.0201	5.64	635	0.60	0.60	94.24
0.000615	0.0156	6.00		0.48	0.48	94.72
0.000435	0.0110	6.50		0.49	0.49	95.21
0.000308	0.00781	7.00		0.60	0.60	95.81
0.000197	0.00500	7.65		0.54	0.54	96.35
0.000077	0.00195	9.00		0.62	0.62	96.97
0.000038	0.000977	10.00		1.26	1.26	98.23
0.000019	0.000488	11.00		1.05	1.05	99.28
0.000015	0.000375	11.38		0.72	0.72	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	**Phi Value**	**Particle Size Inches**	**Particle Size Millimeters**
5	2.35	0.0077	0.197
10	2.54	0.0068	0.172
16	2.68	0.0061	0.156
25	2.84	0.0055	0.139
40	3.07	0.0047	0.119
50	3.21	0.0043	0.108
60	3.36	0.0038	0.097
75	3.65	0.0031	0.080
84	3.95	0.0026	0.065
90	4.39	0.0019	0.048
95	6.28	0.0005	0.013

Measure	Trask	Inman	Folk-Ward
Median, phi	3.21	3.21	3.21
Median, in.	0.0043	0.0043	0.0043
Median, mm	0.108	0.108	0.108
Mean, phi	3.19	3.31	3.28
Mean, in.	0.0043	0.0040	0.0041
Mean, mm	0.109	0.101	0.103
Sorting	1.323	0.633	0.913
Skewness	0.972	0.168	0.365
Kurtosis	0.239	2.114	2.002
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)		

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	79.18
Silt	>0.005 mm	17.18
Clay	<0.005 mm	3.65
	Total	**100**

PTS Laboratories, Inc.

PTS File No: 47478
EHS Support

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422)

PROJECT NAME: Sherwin-Williams Gibbsboro, NJ

PROJECT NO: C05552_2017-200

Report Date: 9-Jan-18

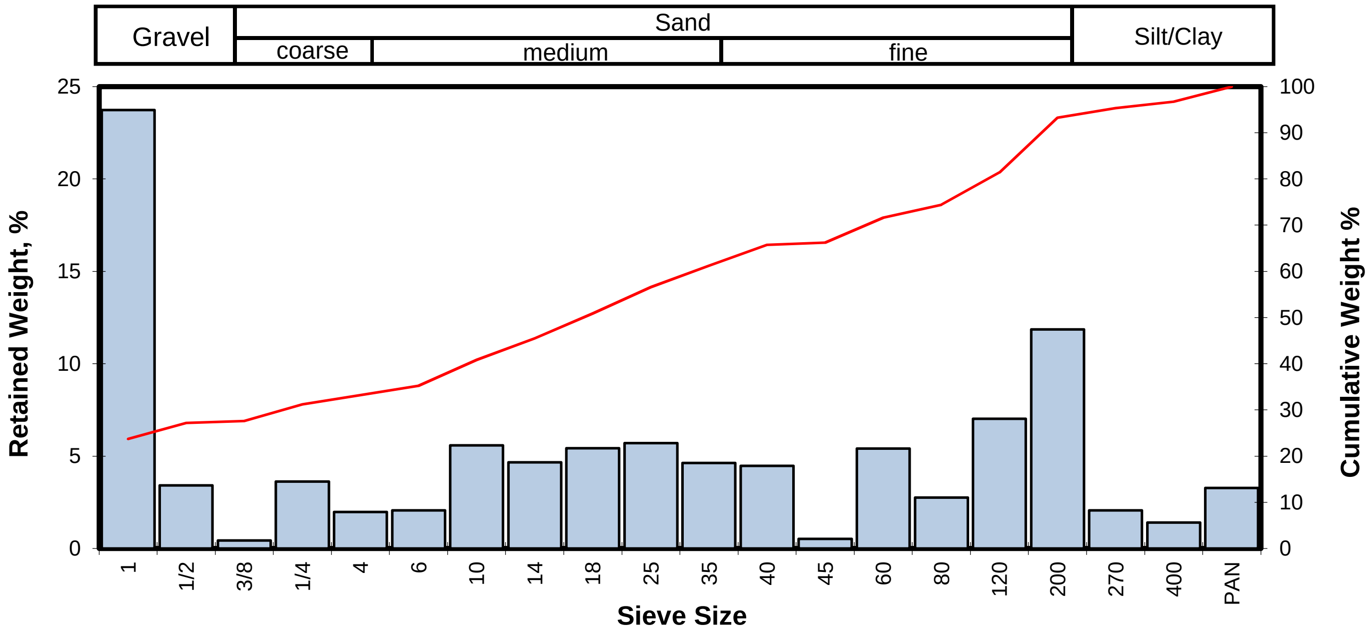
Sample ID	Depth, ft.	Mean Grain Size Description USCS/ASTM (1)	Median Grain Size, mm	Particle Size Distribution, wt. percent				
				Gravel	Sand Size			Silt/Clay
					Coarse	Medium	Fine	
DP-16 (3.3'-4.0')	3.3-3.7	Gravel	1.060	33.18	7.64	24.88	27.55	6.75
DP-17 (1.9'-2.5')	1.9-2.2	Gravel	4.160	48.16	12.38	18.20	16.76	4.49
DP-17 (3.0'-3.6')	3.0-3.3	Medium Sand	0.606	5.27	9.02	51.64	29.41	4.66
DP-22 (7.3'-8.0')	7.5-7.7	Fine sand	0.142	0.00	3.56	26.59	63.46	6.39

(1) Based on Mean from Trask

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	EHS SUPPORT	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-16 (3.3'-4.0')
Project No:	C05552_2017-200	**Depth, ft:**	3.3-3.7



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative Weight,
Inches	**Millimeters**	**Screen**	**No.**	**grams**	**percent**	**percent**
0.9844	25.002	-4.64	1	47.35	23.73	23.73
0.4922	12.501	-3.64	1/2	6.83	3.42	27.16
0.3740	9.500	-3.25	3/8	0.87	0.44	27.59
0.2500	6.351	-2.67	1/4	7.22	3.62	31.21
0.1873	4.757	-2.25	4	3.93	1.97	33.18
0.1324	3.364	-1.75	6	4.11	2.06	35.24
0.0787	2.000	-1.00	10	11.13	5.58	40.82
0.0557	1.414	-0.50	14	9.31	4.67	45.49
0.0394	1.000	0.00	18	10.82	5.42	50.91
0.0278	0.707	0.50	25	11.37	5.70	56.61
0.0197	0.500	1.00	35	9.23	4.63	61.24
0.0166	0.420	1.25	40	8.91	4.47	65.70
0.0139	0.354	1.50	45	1.03	0.52	66.22
0.0098	0.250	2.00	60	10.78	5.40	71.62
0.0070	0.177	2.50	80	5.49	2.75	74.37
0.0049	0.125	3.00	120	14.02	7.03	81.40
0.0029	0.074	3.75	200	23.65	11.85	93.25
0.0021	0.053	4.25	270	4.11	2.06	95.31
0.0015	0.037	4.75	400	2.81	1.41	96.72
			PAN	6.54	3.28	100.00
TOTALS				199.51	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	**Phi Value**	**Particle Size Inches**	**Particle Size Millimeters**
5			
10			
16			
25	-4.27	0.7616	19.346
40	-1.11	0.0850	2.159
50	-0.08	0.0417	1.060
60	0.87	0.0216	0.548
75	2.54	0.0067	0.171
84	3.16	0.0044	0.112
90	3.54	0.0034	0.086
95	4.17	0.0022	0.055

Measure	Trask	Inman	Folk-Ward
Median, phi	-0.08	-0.08	-0.08
Median, in.	0.0417	0.0417	0.0417
Median, mm	1.060	1.060	1.060
Mean, phi	-3.29		
Mean, in.	0.3842		
Mean, mm	9.759		
Sorting	10.624		
Skewness	1.718		
Kurtosis			
Grain Size Description (ASTM-USCS Scale)	Gravel (based on Mean from Trask)		

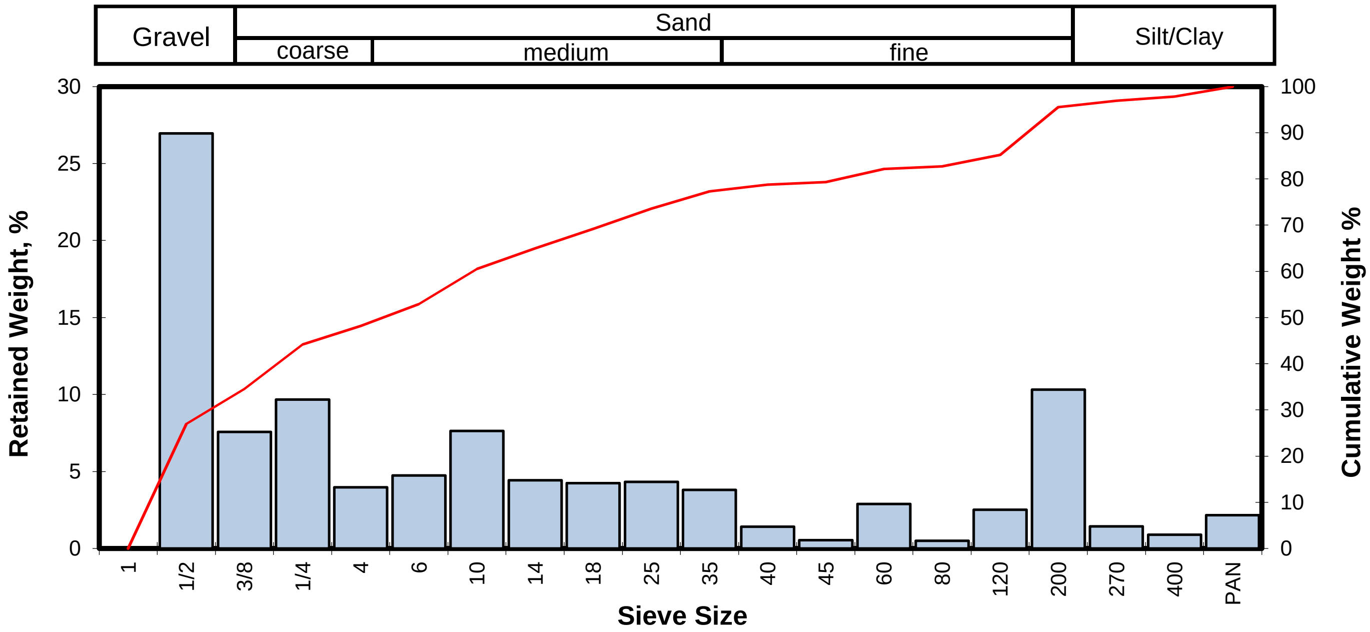
Description	Retained on Sieve #	Weight Percent
Gravel	4	33.18
Coarse Sand	10	7.64
Medium Sand	40	24.88
Fine Sand	200	27.55
Silt/Clay	<200	6.75
	Total	100

Phone: (713) 316-1800

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	EHS SUPPORT	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-17 (1.9'-2.5')
Project No:	C05552_2017-200	**Depth, ft:**	1.9-2.2



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	54.81	26.95	26.95
0.3740	9.500	-3.25	3/8	15.38	7.56	34.52
0.2500	6.351	-2.67	1/4	19.65	9.66	44.18
0.1873	4.757	-2.25	4	8.10	3.98	48.16
0.1324	3.364	-1.75	6	9.65	4.75	52.91
0.0787	2.000	-1.00	10	15.53	7.64	60.55
0.0557	1.414	-0.50	14	9.01	4.43	64.98
0.0394	1.000	0.00	18	8.61	4.23	69.21
0.0278	0.707	0.50	25	8.79	4.32	73.53
0.0197	0.500	1.00	35	7.73	3.80	77.33
0.0166	0.420	1.25	40	2.87	1.41	78.75
0.0139	0.354	1.50	45	1.10	0.54	79.29
0.0098	0.250	2.00	60	5.87	2.89	82.17
0.0070	0.177	2.50	80	1.03	0.51	82.68
0.0049	0.125	3.00	120	5.10	2.51	85.19
0.0029	0.074	3.75	200	20.98	10.32	95.51
0.0021	0.053	4.25	270	2.91	1.43	96.94
0.0015	0.037	4.75	400	1.82	0.90	97.83
			PAN	4.41	2.17	100.00
TOTALS				203.35	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-4.46	0.8656	21.986
10	-4.27	0.7611	19.333
16	-4.05	0.6523	16.569
25	-3.72	0.5175	13.145
40	-2.92	0.2976	7.560
50	-2.06	0.1638	4.160
60	-1.05	0.0817	2.076
75	0.69	0.0244	0.619
84	2.76	0.0058	0.147
90	3.35	0.0039	0.098
95	3.71	0.0030	0.076

Measure	Trask	Inman	Folk-Ward
Median, phi	-2.06	-2.06	-2.06
Median, in.	0.1638	0.1638	0.1638
Median, mm	4.160	4.160	4.160
Mean, phi	-2.78	-0.64	-1.11
Mean, in.	0.2709	0.0615	0.0852
Mean, mm	6.882	1.562	2.165
Sorting	4.610	3.407	2.942
Skewness	0.686	0.415	0.413
Kurtosis	0.326	0.199	0.760
Grain Size Description (ASTM-USCS Scale)	Gravel (based on Mean from Trask)		

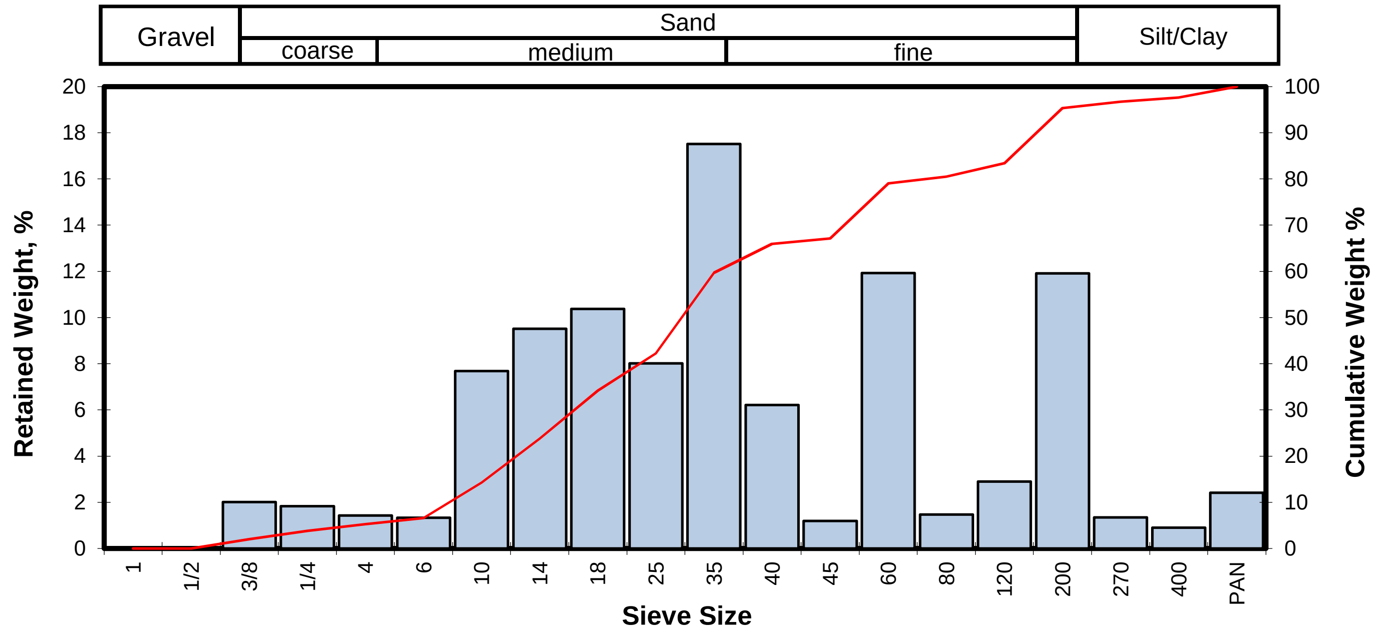
Description	Retained on Sieve #	Weight Percent
Gravel	4	48.16
Coarse Sand	10	12.38
Medium Sand	40	18.20
Fine Sand	200	16.76
Silt/Clay	<200	4.49
	Total	100

Phone: (713) 316-1800

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	EHS SUPPORT	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-17 (3.0'-3.6')
Project No:	C05552_2017-200	**Depth, ft:**	3.0-3.3



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
			Sieve	Weight	Weight,	Weight,
Inches	**Millimeters**	**Screen**	**No.**	**grams**	**percent**	**percent**
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	3.00	2.00	2.00
0.2500	6.351	-2.67	1/4	2.75	1.84	3.84
0.1873	4.757	-2.25	4	2.14	1.43	5.27
0.1324	3.364	-1.75	6	2.00	1.34	6.61
0.0787	2.000	-1.00	10	11.49	7.68	14.29
0.0557	1.414	-0.50	14	14.23	9.51	23.80
0.0394	1.000	0.00	18	15.53	10.38	34.18
0.0278	0.707	0.50	25	12.00	8.02	42.20
0.0197	0.500	1.00	35	26.21	17.52	59.71
0.0166	0.420	1.25	40	9.30	6.22	65.93
0.0139	0.354	1.50	45	1.78	1.19	67.12
0.0098	0.250	2.00	60	17.84	11.92	79.04
0.0070	0.177	2.50	80	2.21	1.48	80.52
0.0049	0.125	3.00	120	4.34	2.90	83.42
0.0029	0.074	3.75	200	17.83	11.92	95.34
0.0021	0.053	4.25	270	2.02	1.35	96.69
0.0015	0.037	4.75	400	1.35	0.90	97.59
			PAN	3.61	2.41	100.00
TOTALS				149.63	100.00	100.00

Cumulative Weight Percent greater than

Weight	Phi	Particle Size	
percent	**Value**	**Inches**	**Millimeters**
5	-2.33	0.1979	5.027
10	-1.42	0.1053	2.674
16	-0.91	0.0740	1.879
25	-0.44	0.0535	1.359
40	0.36	0.0306	0.778
50	0.72	0.0239	0.606
60	1.01	0.0195	0.496
75	1.83	0.0111	0.281
84	3.04	0.0048	0.122
90	3.41	0.0037	0.094
95	3.73	0.0030	0.075

Measure	Trask	Inman	Folk-Ward
Median, phi	0.72	0.72	0.72
Median, in.	0.0239	0.0239	0.0239
Median, mm	0.606	0.606	0.606
Mean, phi	0.29	1.06	0.95
Mean, in.	0.0323	0.0188	0.0204
Mean, mm	0.820	0.479	0.518
Sorting	2.198	1.973	1.905
Skewness	1.020	0.173	0.082
Kurtosis	0.209	0.535	1.093
Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)		

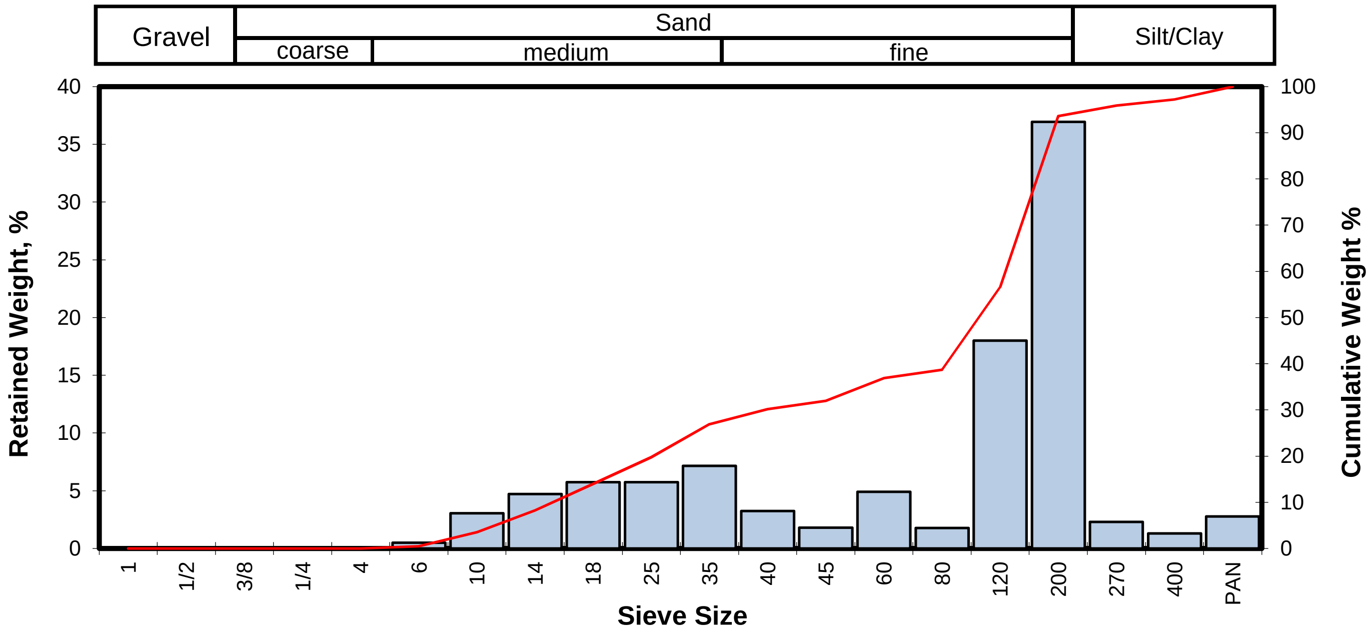
Description	Retained on Sieve #	Weight Percent
Gravel	4	5.27
Coarse Sand	10	9.02
Medium Sand	40	51.64
Fine Sand	200	29.41
Silt/Clay	<200	4.66
	Total	100

Phone: (713) 316-1800

PTS Laboratories, Inc.

Sieve Analysis Results - ASTM D422

Client:	EHS SUPPORT	**PTS File No:**	47478
Project:	Sherwin-Williams Gibbsboro, NJ	**Sample ID:**	DP-22 (7.3'-8.0')
Project No:	C05552_2017-200	**Depth, ft:**	7.5-7.7



Opening		Phi of	U.S.	Sample	Incremental	Cumulative
Inches	Millimeters	Screen	Sieve No.	Weight grams	Weight, percent	Weight, percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	0.00	0.00	0.00
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.48	0.51	0.51
0.0787	2.000	-1.00	10	2.89	3.06	3.56
0.0557	1.414	-0.50	14	4.46	4.72	8.28
0.0394	1.000	0.00	18	5.44	5.75	14.03
0.0278	0.707	0.50	25	5.42	5.73	19.76
0.0197	0.500	1.00	35	6.77	7.16	26.92
0.0166	0.420	1.25	40	3.06	3.24	30.16
0.0139	0.354	1.50	45	1.71	1.81	31.97
0.0098	0.250	2.00	60	4.64	4.91	36.87
0.0070	0.177	2.50	80	1.69	1.79	38.66
0.0049	0.125	3.00	120	17.03	18.01	56.67
0.0029	0.074	3.75	200	34.94	36.95	93.61
0.0021	0.053	4.25	270	2.17	2.29	95.91
0.0015	0.037	4.75	400	1.24	1.31	97.22
			PAN	2.63	2.78	100.00
TOTALS				94.57	100.00	100.00

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	-0.85	0.0709	1.800
10	-0.35	0.0502	1.275
16	0.17	0.0350	0.888
25	0.87	0.0216	0.549
40	2.54	0.0068	0.172
50	2.81	0.0056	0.142
60	3.07	0.0047	0.119
75	3.37	0.0038	0.097
84	3.55	0.0034	0.085
90	3.68	0.0031	0.078
95	4.05	0.0024	0.060

Measure	Trask	Inman	Folk-Ward
Median, phi	2.81	2.81	2.81
Median, in.	0.0056	0.0056	0.0056
Median, mm	0.142	0.142	0.142
Mean, phi	1.63	1.86	2.18
Mean, in.	0.0127	0.0108	0.0087
Mean, mm	0.323	0.275	0.221
Sorting	2.384	1.692	1.588
Skewness	1.620	-0.563	-0.529
Kurtosis	0.189	0.448	0.801
Grain Size Description (ASTM-USCS Scale)	Fine sand (based on Mean from Trask)		

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	3.56
Medium Sand	40	26.59
Fine Sand	200	63.46
Silt/Clay	<200	6.39
	Total	100

PTS File No: 47478
Client: EHS Support
Report Date: 01/09/18

PTS Laboratories

PHYSICAL PROPERTIES DATA - PORE FLUID SATURATIONS

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40	
				DENSITY		POROSITY, %Vb (2)		PORE FLUID SATURATIONS, % Pv (3)	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	MOISTURE CONTENT, % weight	DRY BULK, g/cc	GRAIN, g/cc	TOTAL	AIR FILLED	WATER	NAPL
DP-1 (15.3'-16.0')	15.3-15.5	V	21.8	1.33	2.67	50.2	20.7	54.0	4.7
DP-2 (12.0'-12.6')	12.0-12.2	V	17.7	1.45	2.66	45.5	19.5	53.3	3.9
DP-5 (11.5'-12.2')	11.5-11.7	V	24.2	1.37	2.68	48.9	15.1	61.9	7.3
DP-8 (12.0'-12.7')	12.0-12.2	V	23.0	1.43	2.67	46.4	13.2	69.6	2.0
DP-13 (6.5'-7.2')	6.5-6.7	V	25.2	1.41	2.68	47.2	11.1	72.1	4.3
DP-14 (13.5'-14.2')	13.5-13.7	V	25.2	1.39	2.67	48.2	13.1	70.6	2.2
DP-15 (11.0'-11.7')	11.0-11.2	V	23.5	1.43	2.67	46.6	12.9	71.2	1.1
DP-16 (3.3'-4.0')	3.3-3.5	V	14.2	1.33	2.48	46.4	27.0	39.4	2.4
DP-17 (1.9'-2.5')	1.9-2.1	V	10.8	1.64	2.65	38.2	20.2	43.4	3.8
DP-17 (4.4'-5.0')	4.4-4.6	V	21.4	1.47	2.67	44.8	13.0	69.0	1.9
DP-18 (6.5'-7.2')	6.5-6.7	V	22.8	1.41	2.69	47.5	15.1	67.6	0.7
DP-20 (8.0'-8.8')	8.0-8.2	V	23.2	1.45	2.70	46.4	12.6	69.6	3.3
DP-21 (10.7'-11.2')	10.7-10.9	V	20.3	1.44	2.68	46.5	17.0	58.1	5.5
DP-21 (14.0'-14.6')	14.0-14.2	V	24.2	1.37	2.68	49.0	15.9	63.5	5.0
DP-21 (16.9'-17.3')	17.1-17.3	V	30.0	1.39	2.65	47.5	9.4	79.1	1.0
DP-22 (7.3'-8.0')	7.5-7.7	V	10.1	1.75	2.66	34.2	16.3	51.0	1.4
DP-22 (11.3'-12.0')	11.8-12.0	V	22.7	1.37	2.68	48.9	17.1	56.4	8.7
DP-22 (17.7'-18.3')	17.7-17.9	V	24.5	1.36	2.67	49.0	15.4	67.1	1.5
DP-22 (20.5'-21.0')	20.5-20.7	V	26.0	1.47	2.69	45.4	6.6	80.7	4.8
DP-23 (11.0'-11.7')	11.0-11.2	V	9.6	1.45	2.67	45.7	31.6	28.8	2.2
DP-23 (16.0'-16.7')	16.0-16.2	V	23.0	1.44	2.68	46.3	13.1	71.6	0.1
DP-24 (17.0'-17.5')	17.0-17.2	V	24.8	1.51	2.68	43.6	5.9	86.2	0.3

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.
(3) Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.8600 g/cc.
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 47478
Client: EHS Support
Report Date: 01/09/18

PTS Laboratories

PHYSICAL PROPERTIES DATA - DRAINAGE (EFFECTIVE) POROSITY

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

			METHODS:	API RP 40 / Mod. ASTM D425	Mod. ASTM D425
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	TOTAL POROSITY (2), %Vb	EFFECTIVE POROSITY, %Vb
DP-4 (13.5'-14.2')	13.5-13.7	V	20171222	40.9	32.5
DP-9 (8.0'-8.8')	8.6-8.8	V	20171222	38.6	29.2
DP-13 (2.2'-3.0')	2.2-2.4	V	20171222	41.9	33.7
DP-14 (6.8'-7.5')	6.8-7.0	V	20171222	43.9	36.0
DP-15 (6.8'-7.4')	6.8-7.0	V	20171222	39.7	29.3
DP-17 (3.0'-3.6')	3.0-3.2	V	20171222	30.3	26.4
DP-18 (3.5'-4.2')	4.0-4.2	V	20171222	42.4	34.7
DP-20 (6.2-6.8)	6.6-6.8	V	20171224	40.4	30.5
DP-21 (11.2'-11.7')	11.2-11.4	V	20171225	40.3	22.9
DP-22 (13.5'-14.2')	13.5-13.7	V	20171226	42.5	34.9
DP-23 (14.0'-14.7')	14.0-14.2	V	20171226	42.5	31.2
DP-24 (13.5'-14.2')	13.5-13.7	V	20171226	39.7	29.2

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels.
Vb = Bulk Volume, cc; ND = Not Detected

Table 1
Soil Sample Intervals for PTS Laboratory Analysis
Gibbsboro, NJ Project
November 14, 2017

Core Boring ID	Soil Core (ft)	Grain Size Analyses ASTM D446	Pore Fluid Sat. Package	Air/Water Displacing Oil Inhibition Tests, Capillary Pressure	Effective Drainage Porosity ASTM D425	Grain Size Analyses ASTM D446
DP-1	15.3-16	15.3-16	15.3-16	na	na	na
DP-2	12-12.6	12-12.6	12-12.6	na	na	na
DP-4	13.5-14.2	na	na	13.5-14.2	13.5-14.2	13.5-14.2
DP-5	11.5-12.2	11.5-12.2	11.5-12.2	na	na	na
DP-8	12-12.7	12-12.7	12-12.7	na	na	na
DP-9	8-8.8	na	na	8-8.8	8-8.8	8-8.8
DP-13	2.2-3, 6.5-7.2	6.5-7.2	6.5-7.2	2.2-3	2.2-3	2.2-3
DP-14	6.8-7.5, 13.5-14.2	13.5-14.2	13.5-14.2	6.8-7.5	6.8-7.5	6.8-7.5
DP-15	6.8-7.4, 11-11.7	11-11.7	11-11.7	6.8-7.4	6.8-7.4	6.8-7.4
DP-16	3.3-4	3.3-4	3.3-4	na	na	na
DP-17	1.9-2.5, 3-3.6, 4.4-5	1.9-2.5	1.9-2.5	3-3.6	3-3.6	3-3.6
		4.4-5	4.4-5	na	na	na
DP-18	3.5-4.2, 6.5-7.2	6.5-7.2	6.5-7.2	3.5-4.2	3.5-4.2	3.5-4.2
DP-20	6.2-6.8, 8-8.8	8-8.8	8-8.8	6.2-6.8	6.2-6.8	6.2-6.8
DP-21	10.7-11.2, 11.2-11.7, 14-14.6, 16.9-17.3	10.7-11.2	10.7-11.2	11.2-11.7	11.2-11.7	11.2-11.7
		14-14.6	14-14.6	na	na	na
		16.9-17.3	16.9-17.3	na	na	na
DP-22	7.3-8, 11.3-12, 13.5-14.2, 17.7-18.3, 20.5-21	7.3-8	7.3-8	13.5-14.2	13.5-14.2	13.5-14.2
		11.3-12	11.3-12	na	na	na
		17.7-18.3	17.7-18.3	na	na	na
		20.5-21	20.5-21	na	na	na
DP-23	11-11.7, 14-14.7, 16-16.7	11-11.7	11-11.7	14-14.7	14-14.7	14-14.7
		16-16.7	16-16.7	na	na	na
DP-24	13.5-14.2, 17-17.5	17-17.5	17-17.5	13.5-14.2	13.5-14.2	13.5-14.2

Notes:

= interval to be retained by PTS (interval was not collected during EHS Support lab visit).

na = not applicable

5730 Centralcrest St. • Houston, TX 77092
Telephone (713) 316-1800 • Fax (877) 225-9953

February 8, 2018

Jeff Engels, PG
Michelle Stayrook
Project Manager
EHS Support LLC
27822 Camino Santo Domingo
San Juan Capistrano, CA 92675

Re: PTS File No: 47478
Project Name: Sherwin-Williams Gibbsboro, NJ
Project Number: C05552-2017-200
Air/Water Displacing Oil Imbibition Capillary Pressure Test

Please find enclosed final report for Physical Properties analyses conducted upon samples received from your Gibbsboro, NJ project.

All analyses were performed by applicable ASTM, EPA, or API methodologies. The samples are currently in storage and will be retained for thirty days past the completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact myself or Emeka Anazodo at (713) 316-1800.

Sincerely,
PTS Laboratories, Inc.

Rick Schweizer

Rick Schweizer
Laboratory Supervisor

Encl.

PTS Laboratories

Project Name: **Sherwin-Williams Gibbsboro, NJ** **PTS File No: 47478**
Project Number: **C05552_2017-200** **Client: EHS Support**

TEST PROGRAM - 20180129

CORE ID	Depth ft.	PTS Sample ID #	Grain Size Analysis ASTM D4464M	Pore Fluid Saturation Package	Water displacing NAPL Imbibition Capillary Pressure	Effective Porosity Mod. ASTM D425	Requested Sample Depth, ft.	Comments
		Plugs:	Grab	Hor. 1.5"	Hor. 1"	Vert. 1.5"		
Date Received: 20171114								
DP-4	**13.5-14.2**	3			**X**		**13.9**	
DP-9	**8.0-8.8**	6			**X**		**8.4**	
DP-13	**2.2-3.0**	7			**X**		**2.7**	
DP-14	**6.8-7.5**	9			**X**		**6.8**	
DP-15	**6.8-7.4**	11			**X**		**7.2**	
DP-17	**3.0-3.6**	15			**X**		**3.0**	
DP-18	**3.5-4.2**	17			**X**		**3.5**	
DP-20	**6.2-6.8**	19			**X**		**6.7**	
DP-21	**11.2-11.7**	22			**X**		**11.5**	
DP-22	**13.5-14.2**	27			**X**		**13.5**	
DP-23	**14.0-14.7**	31			**X**		**14.0**	
DP-24	**13.5-14.2**	33			**X**		**13.9**	
TOTALS:			**0**	**0**	**12**	**0**		

Laboratory Test Program Notes
Contaminant identification:

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

SAMPLE PROPERTIES - MODIFIED OIL-WATER IMBIBITION CAPILLARY PRESSURE
Initial and Final Saturations

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

		METHODS:	API RP 40 / ASTM D2216	API RP 40		API RP 40		API RP 40, DEAN-STARK			
								PORE FLUID SATURATIONS (3), % Pv			
		SAMPLE	MOISTURE	DENSITY		POROSITY, %Vb (2)		Initial Fluid Saturations		After Imbibition Capillary Pressure	
SAMPLE ID.	DEPTH, ft.	ORIENTATION (1)	CONTENT, % weight	DRY BULK, g/cc	GRAIN, g/cc	TOTAL	AIR FILLED	WATER (Swi) SATURATION	NAPL (Soi) SATURATION	WATER (Srw) SATURATION	NAPL (Sor) SATURATION
DP-4 (13.5-14.2)	13.9	H	15.6	1.39	2.67	47.98	9.8	41.3	4.8	74.8	4.8
DP-9 (8-8.8)	8.4	H	14.4	1.46	2.66	45.19	2.8	43.5	3.5	90.3	3.5
DP-13 (2.2-3)	2.7	H	9.3	1.42	2.65	46.15	6.4	27.0	2.2	84.0	2.2
DP-14 (6.8-7.5)	6.8	H	23.7	1.52	2.70	43.51	2.3	78.5	5.7	88.9	5.7
DP-15 (6.8-7.4)	7.2	H	18.2	1.33	2.67	50.23	13.3	46.1	3.0	70.5	3.0
DP-17 (3-3.6)	3.0	H	17.4	1.55	2.67	41.80	7.4	61.6	4.3	78.0	4.3
DP-18 (3.5-4.2)	3.5	H	13.8	1.52	2.67	43.18	11.5	47.2	5.1	68.3	5.1
DP-20 (6.2-6.8)	6.7	H	14.4	1.42	2.66	46.49	1.8	39.3	6.1	90.2	6.1
DP-21 (11.2-11.7)	11.5	H	20.2	1.43	2.68	46.69	8.8	60.1	1.7	79.5	1.7
DP-22 (13.5-14.2)	13.5	H	22.5	1.42	2.69	47.02	1.7	61.2	8.3	88.1	8.3
DP-23 (14-14.7)	14.0	H	21.5	1.39	2.67	47.89	10.8	59.1	3.6	73.8	3.6
DP-24 (13.5-14.2)	13.9	H	19.2	1.55	2.68	42.14	3.2	50.2	3.6	88.8	3.6

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Total Porosity = all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids.
(3) Fluid density used to calculate pore fluid saturations: Water = 0.9996 g/cc, NAPL = 0.7923 g/cc.
Swi = Initial Water Saturation as received prior to testing, Soi = Initial NAPL Saturation as received prior to testing.
Srw = Residual Water Saturation after testing, Sor = Residual NAPL Saturation after testing.
Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-4 (13.5'-14.2') at 13.9 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	41.3	4.8	46.1
0.000	0.00	0.00	41.3	4.8	46.1
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	41.3	4.8	46.1
-0.061	-4.28	0.68	46.7	4.8	51.5
-0.111	-7.83	1.24	52.7	4.8	57.5
-0.172	-12.1	1.91	56.8	4.8	61.6
-0.243	-17.1	2.71	61.4	4.8	66.2
-0.439	-30.9	4.89	67.4	4.8	72.2
-0.676	-47.5	7.52	69.4	4.8	74.2
-1.73	-122	19.3	72.7	4.8	77.6
-2.71	-190	30.1	74.1	4.8	78.9
-6.11	-429	68.0	74.5	4.8	79.3
-10.85	-763	120.7	74.7	4.8	79.6

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

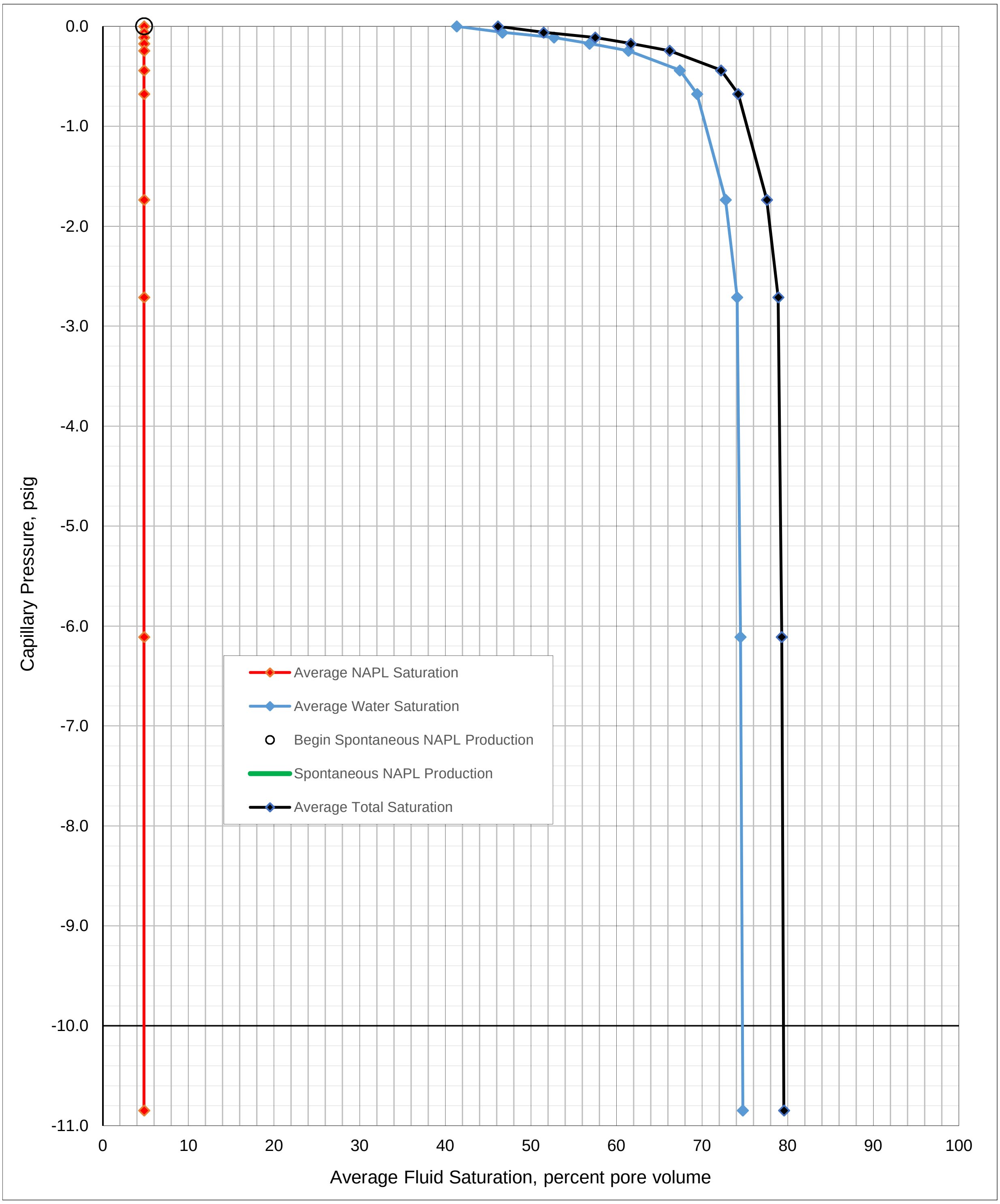
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-4 (13.5-14.2)
Depth, ft.: 13.9



PTS Laboratories

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-9 (8.0'-8.8') at 8.4 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	43.5	3.5	47.0
0.000	0.00	0.00	43.5	3.5	47.0
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	43.5	3.5	47.0
-0.060	-4.23	0.67	49.6	3.5	53.1
-0.110	-7.74	1.23	53.6	3.5	57.1
-0.170	-11.93	1.89	58.0	3.5	61.5
-0.240	-16.9	2.68	61.8	3.5	65.4
-0.434	-30.5	4.83	65.7	3.5	69.2
-0.668	-47.0	7.43	69.5	3.5	73.0
-1.71	-120.5	19.1	78.7	3.5	82.2
-2.68	-188	29.8	83.3	3.5	86.8
-6.04	-424	67.2	88.6	3.5	92.1
-10.72	-754	119.3	90.3	3.5	93.8

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

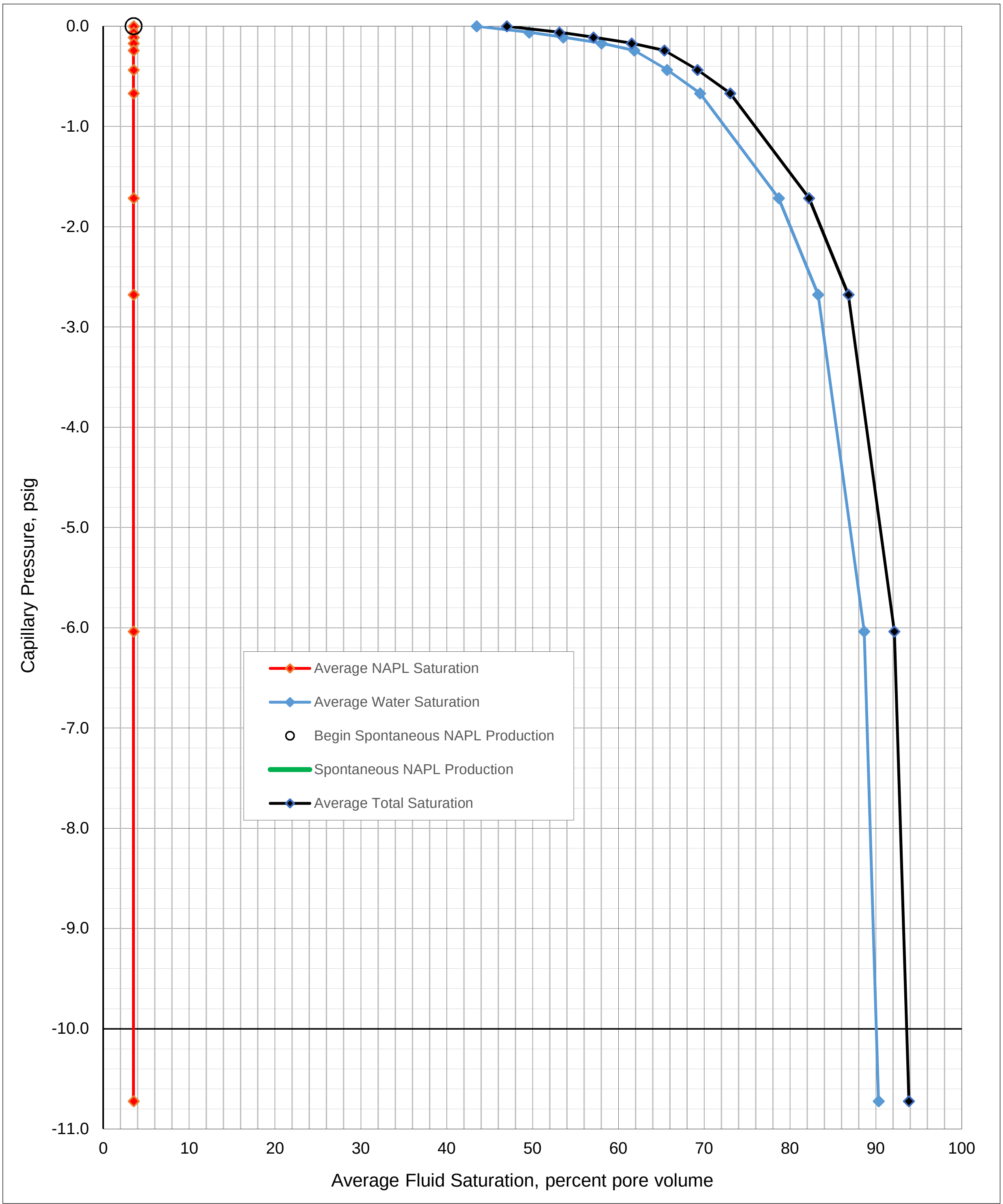
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-9 (8-8.8)
Depth, ft.: 8.4



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-13 (2.2'-3.0') at 2.7 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	27.0	2.2	29.2
0.000	0.00	0.00	27.0	2.2	29.2
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	27.7	2.2	29.9
-0.062	-4.34	0.69	32.7	2.2	34.9
-0.113	-7.95	1.26	39.1	2.2	41.3
-0.174	-12.3	1.94	49.2	2.2	51.4
-0.247	-17.4	2.75	64.0	2.2	66.2
-0.446	-31.3	4.96	68.3	2.2	70.5
-0.686	-48.2	7.63	73.3	2.2	75.5
-1.76	-124	19.6	77.5	2.2	79.7
-2.75	-193	30.6	81.1	2.2	83.3
-6.20	-436	69.0	82.8	2.2	85.0
-11.01	-774	123	83.9	2.2	86.1

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

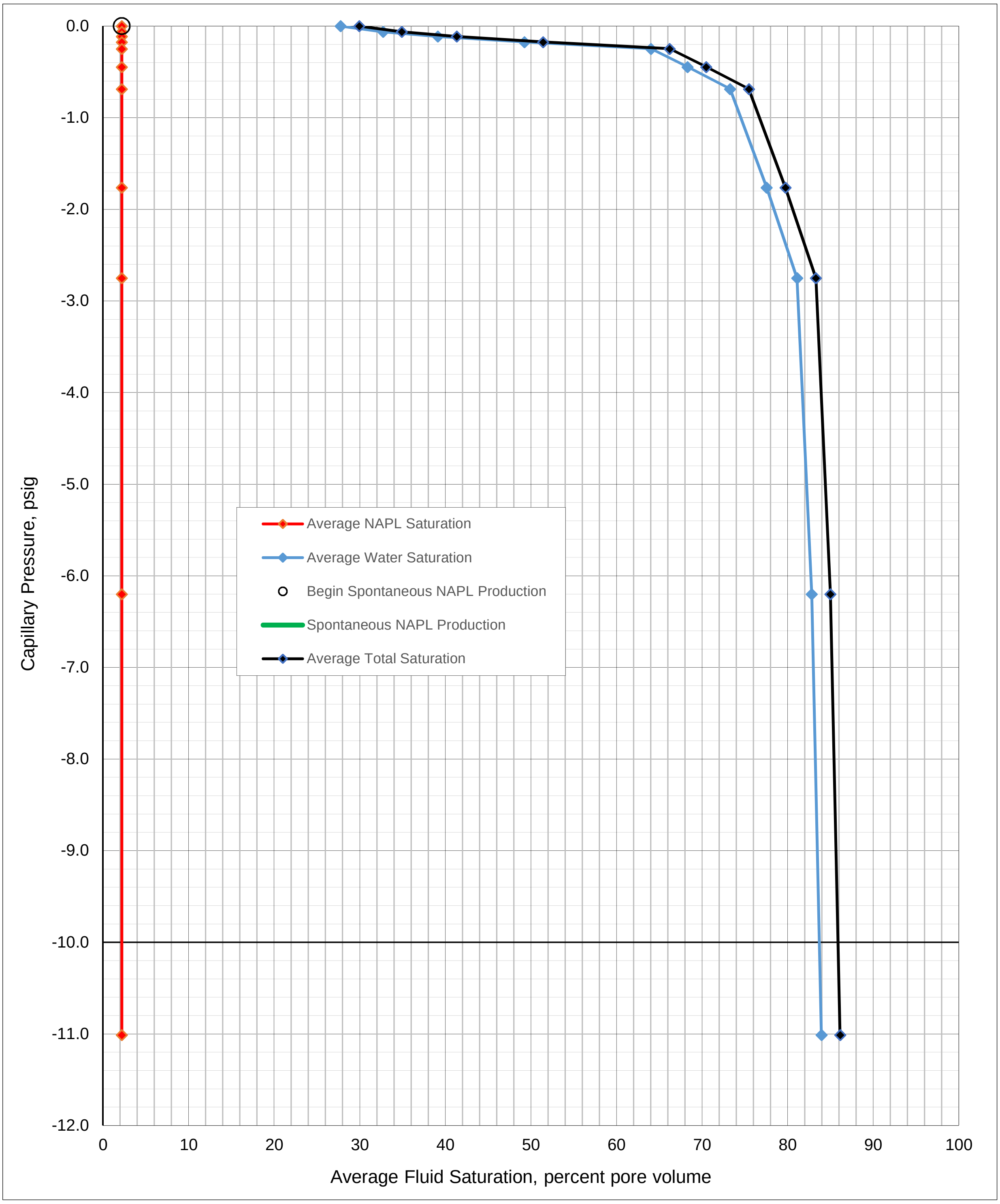
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-13 (2.2-3)
Depth, ft.: 2.7



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID **DP-14 (6.8'-7.5') at 6.8 ft.** Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	78.5	5.7	84.2
0.000	0.00	0.00	78.5	5.7	84.2
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	78.7	5.7	84.3
-0.064	-4.49	0.71	80.0	5.7	85.7
-0.117	-8.22	1.30	81.5	5.7	87.2
-0.180	-12.7	2.01	83.0	5.7	88.6
-0.255	-18.0	2.84	84.0	5.7	89.7
-0.461	-32.4	5.13	85.1	5.7	90.7
-0.710	-49.9	7.90	86.0	5.7	91.6
-1.82	-128	20.3	86.8	5.7	92.5
-2.84	-200	31.6	87.9	5.7	93.6
-6.41	-451	71.3	88.5	5.7	94.1
-11.39	-801	127	88.9	5.7	94.6

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

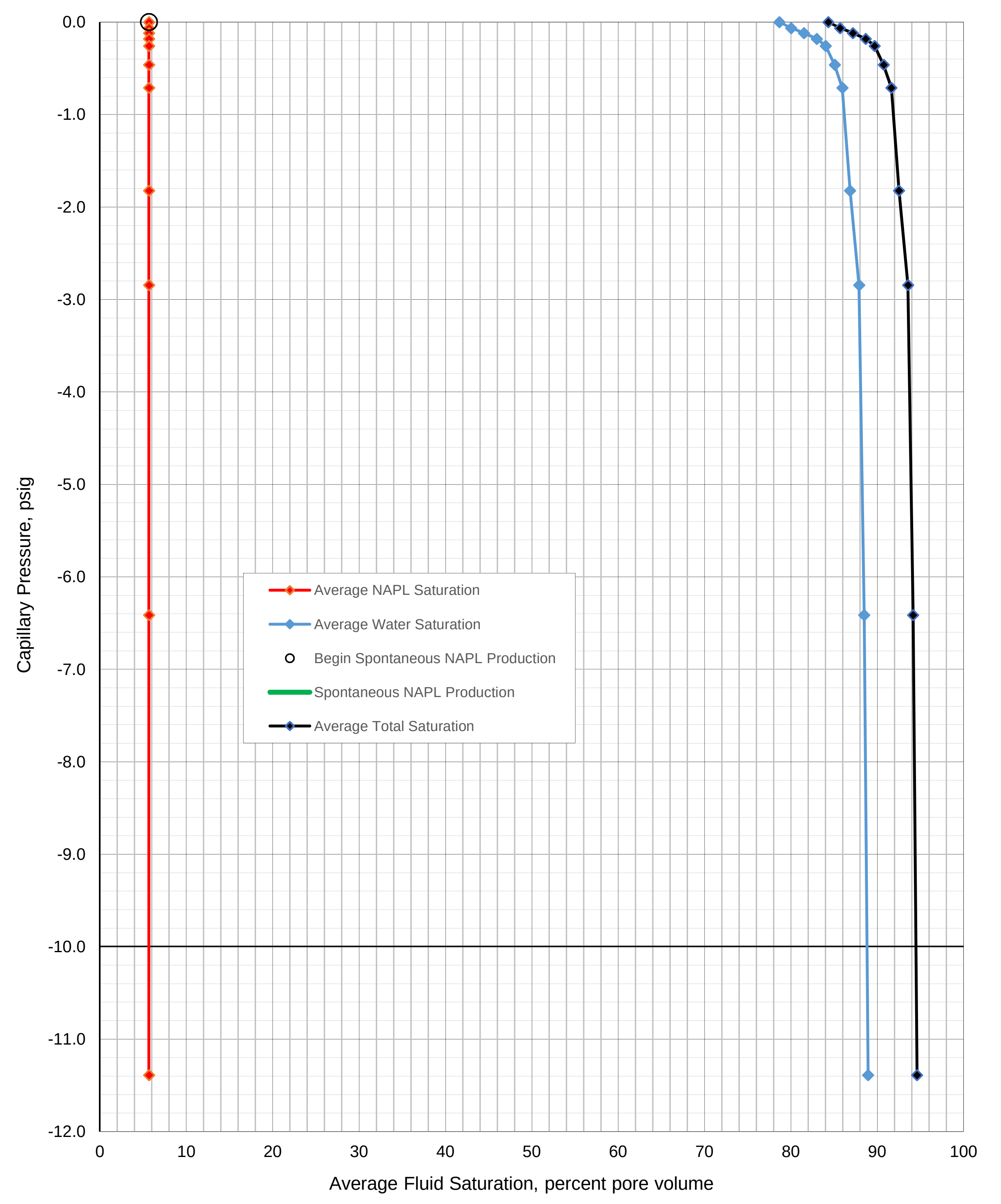
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-14 (6.8-7.5)
Depth, ft.: 6.8



PTS File No:	47478	**PTS** Laboratories
Client:	EHS Support LLC	
Report Date:	02/06/18	

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-15 (6.8'-7.4') at 7.2 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	46.0	3.0	49.1
0.000	0.00	0.00	46.0	3.0	49.1
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	46.0	3.0	49.1
-0.064	-4.47	0.71	47.2	3.0	50.2
-0.116	-8.18	1.29	47.7	3.0	50.7
-0.179	-12.61	1.99	49.3	3.0	52.3
-0.254	-17.9	2.83	52.2	3.0	55.2
-0.458	-32.2	5.10	56.7	3.0	59.7
-0.706	-49.6	7.85	61.5	3.0	64.5
-1.81	-127.4	20.2	66.5	3.0	69.5
-2.83	-199	31.5	68.6	3.0	71.6
-6.38	-448	71.0	70.1	3.0	73.1
-11.33	-796	126.0	70.6	3.0	73.6

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

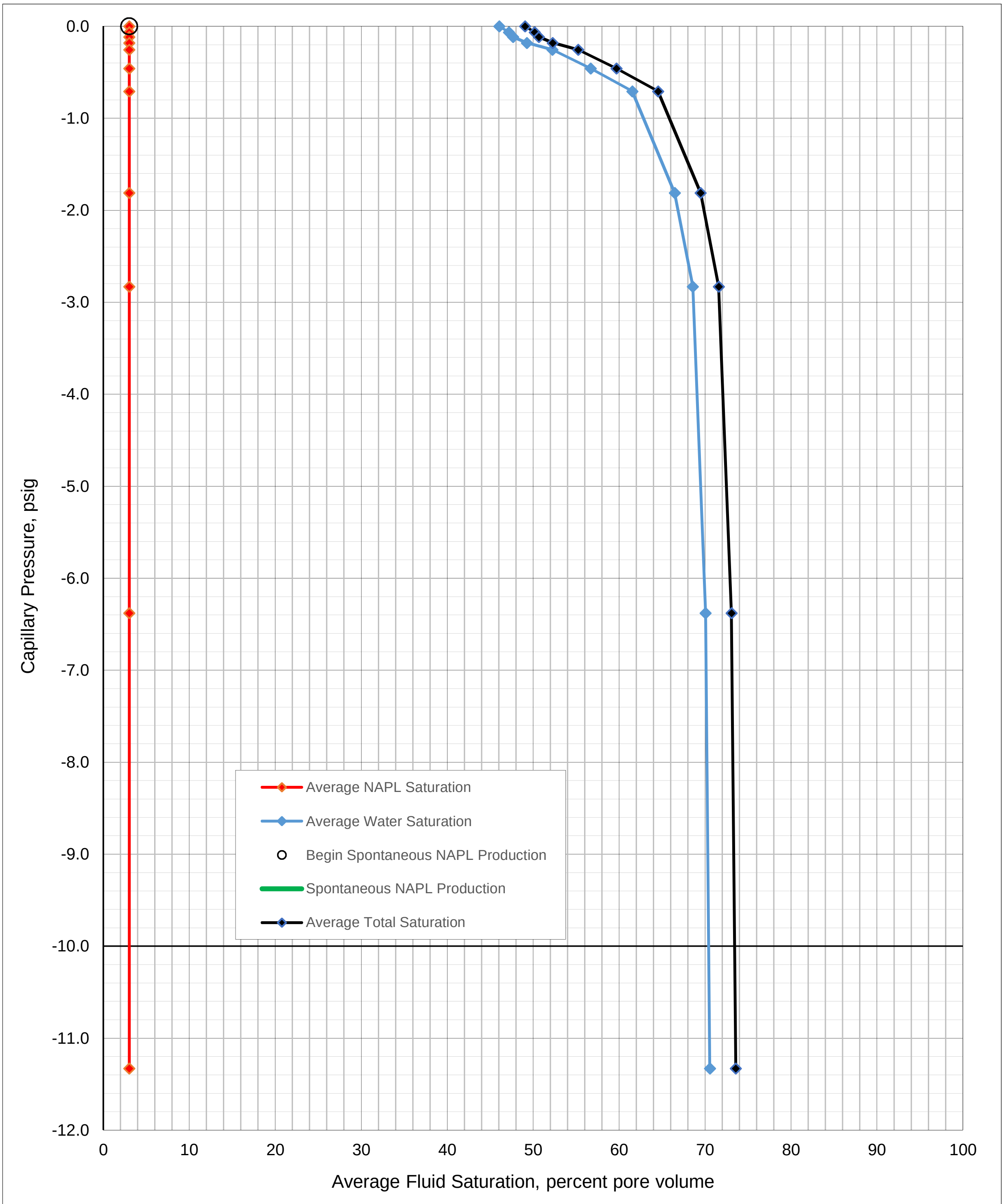
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-15 (6.8-7.4)
Depth, ft.: 7.2



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID **DP-17 (3.0'-3.6') at 3.0 ft.** Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	61.6	4.3	65.9
0.000	0.00	0.00	61.6	4.3	65.9
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	61.6	4.3	65.9
-0.061	-4.31	0.68	62.4	4.3	66.7
-0.112	-7.90	1.25	64.0	4.3	68.3
-0.173	-12.17	1.93	65.8	4.3	70.0
-0.245	-17.2	2.73	68.2	4.3	72.4
-0.443	-31.1	4.92	70.4	4.3	74.6
-0.681	-47.9	7.58	72.0	4.3	76.2
-1.75	-122.9	19.5	74.0	4.3	78.3
-2.73	-192	30.4	75.3	4.3	79.6
-6.16	-433	68.5	76.8	4.3	81.0
-10.93	-769	121.7	78.0	4.3	82.3

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/06/18

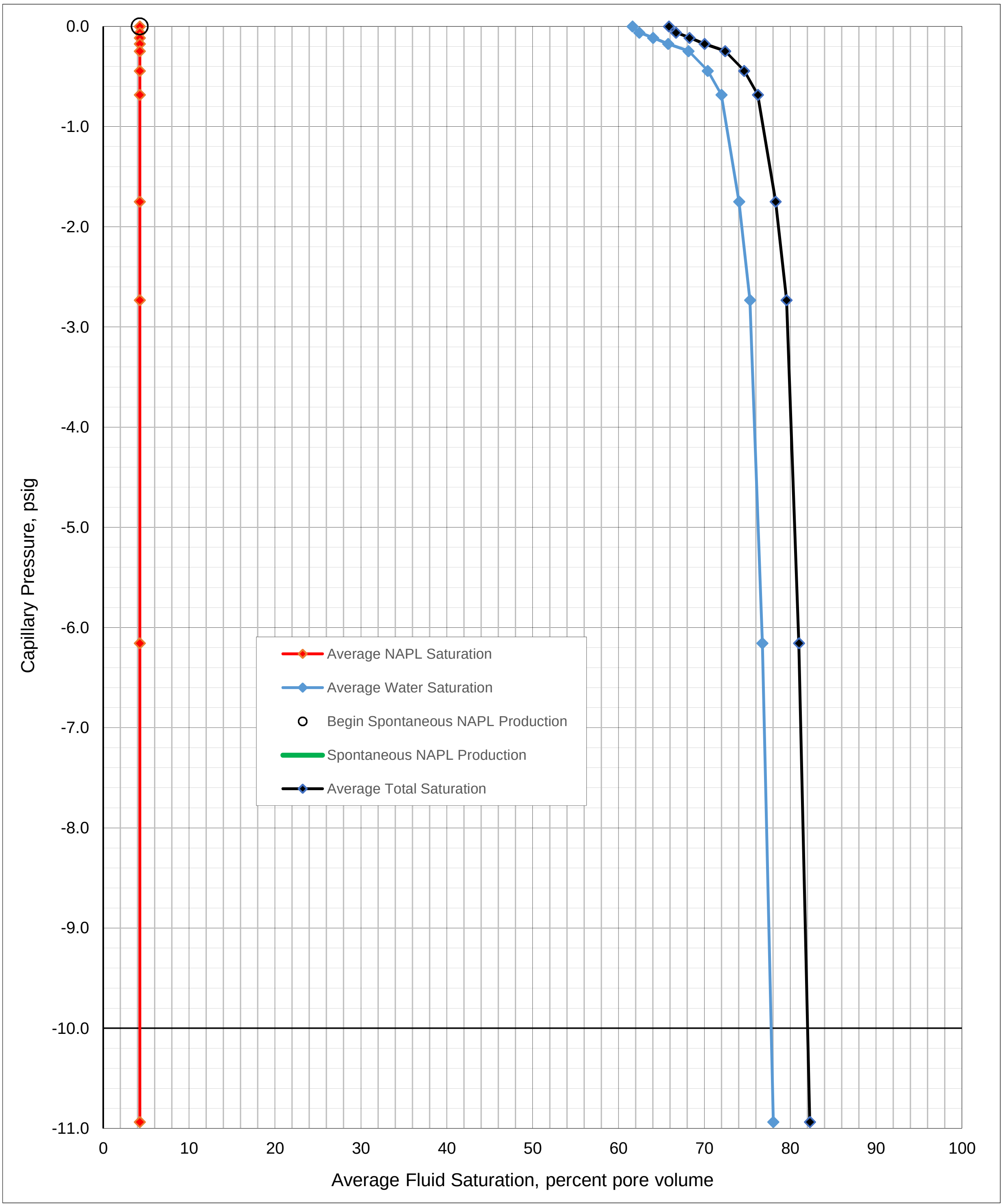
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-17 (3-3.6)
Depth, ft.: 3.0



PTS Laboratories

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table, ft	Sample ID: **DP-18 (3.5'-4.2') at 3.5 ft.** Average Saturation, % pore volume		
psi	cm water		Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	47.2	5.1	52.3
0.000	0.00	0.00	47.2	5.1	52.3
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	47.2	5.1	52.3
-0.063	-4.43	0.70	49.4	5.1	54.4
-0.115	-8.11	1.28	51.2	5.1	56.3
-0.180	-12.7	2.01	52.2	5.1	57.3
-0.253	-17.8	2.82	54.3	5.1	59.4
-0.459	-32.3	5.11	56.6	5.1	61.7
-0.699	-49.2	7.78	58.6	5.1	63.7
-1.79	-126	19.9	63.6	5.1	68.6
-2.80	-197	31.2	66.0	5.1	71.1
-6.33	-445	70.4	67.7	5.1	72.8
-11.21	-788	124.8	68.3	5.1	73.3

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS Laboratories

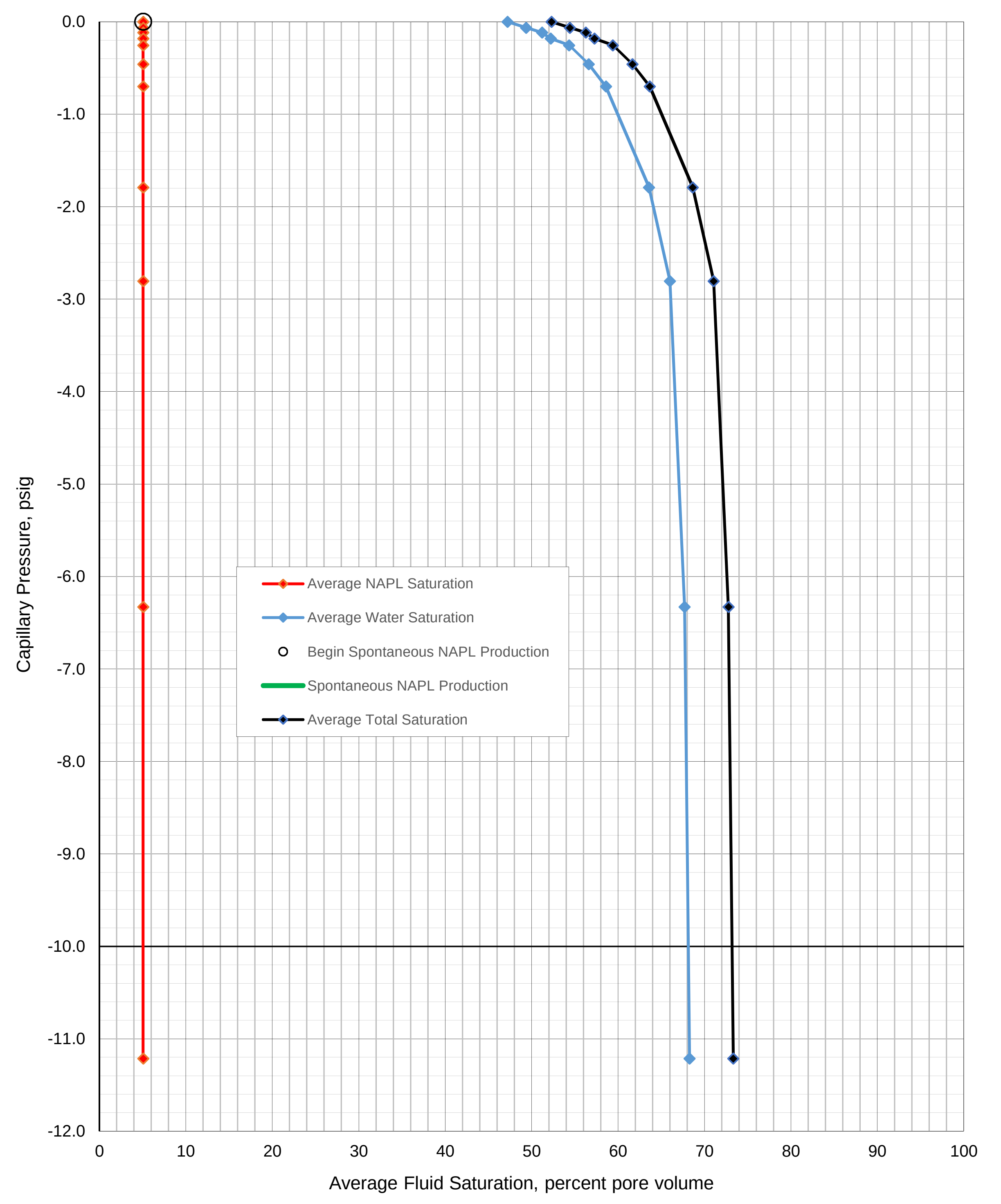
PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-18 (3.5-4.2)
Depth, ft.: 3.5



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID **DP-20 (6.2-6.8) at 6.7 ft.** Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	39.3	6.1	45.4
0.000	0.00	0.00	39.3	6.1	45.4
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	39.3	6.1	45.4
-0.062	-4.38	0.69	45.3	6.1	51.3
-0.114	-8.02	1.27	52.0	6.1	58.0
-0.179	-12.6	1.99	56.6	6.1	62.7
-0.251	-17.6	2.79	61.7	6.1	67.7
-0.454	-31.9	5.05	67.6	6.1	73.7
-0.692	-48.7	7.70	73.9	6.1	79.9
-1.77	-125	19.7	81.8	6.1	87.8
-2.77	-195	30.9	86.1	6.1	92.2
-6.26	-440	69.7	89.2	6.1	95.3
-11.10	-780	123.5	90.1	6.1	96.2

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

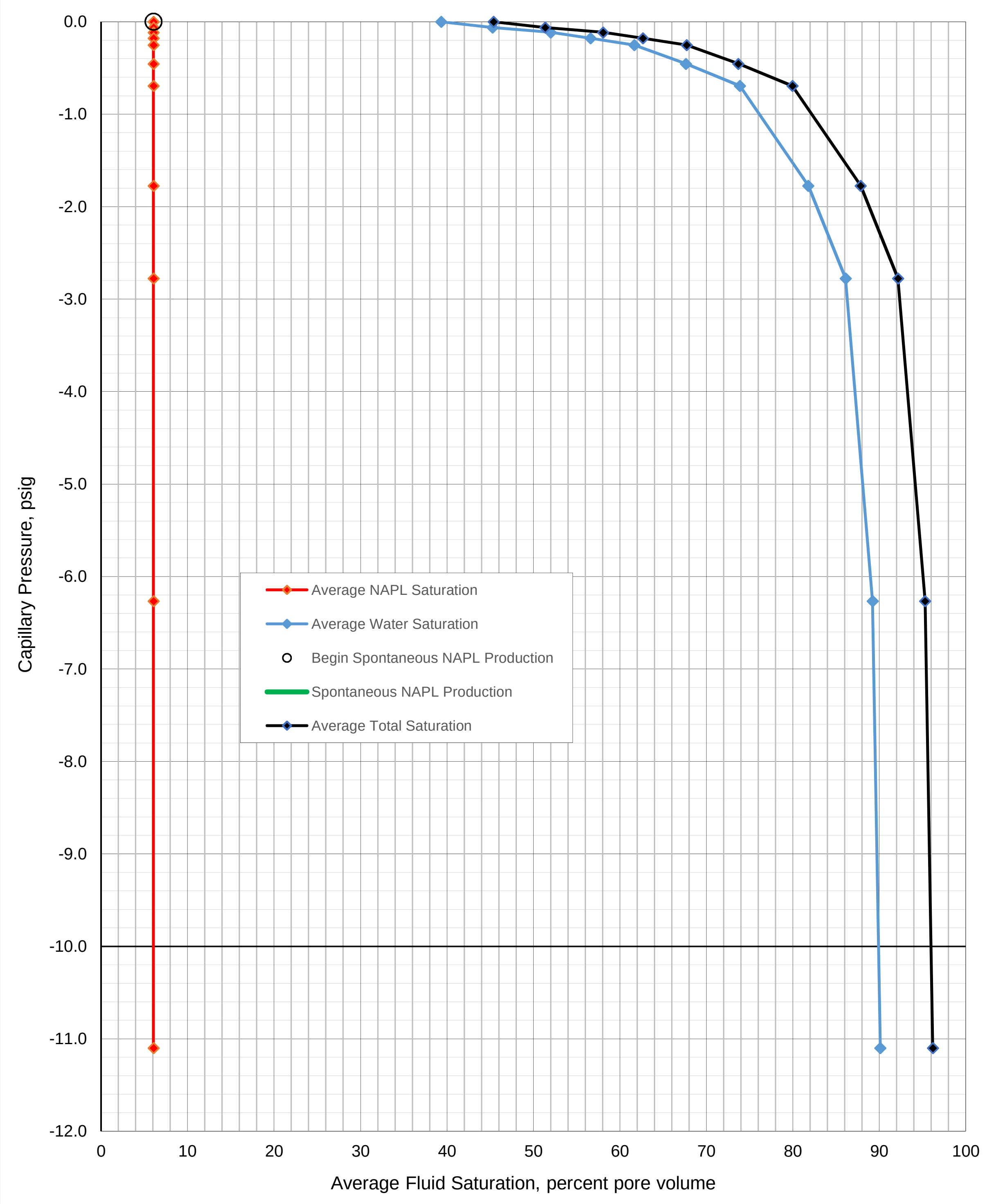
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-20 (6.2-6.8)
Depth, ft.: 6.7



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-21 (11.2'-11.7') at 11.5 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	60.1	1.7	61.8
0.000	0.00	0.00	60.1	1.7	61.8
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	60.1	1.7	61.8
-0.062	-4.37	0.69	61.4	1.7	63.2
-0.114	-8.00	1.27	62.1	1.7	63.8
-0.178	-12.5	1.98	64.1	1.7	65.9
-0.250	-17.6	2.78	65.5	1.7	67.2
-0.453	-31.8	5.04	68.2	1.7	69.9
-0.690	-48.5	7.68	70.9	1.7	72.6
-1.77	-124	19.7	75.2	1.7	76.9
-2.77	-194	30.8	76.9	1.7	78.7
-6.24	-439	69.5	79.2	1.7	80.9
-11.06	-778	123.1	79.5	1.7	81.2

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

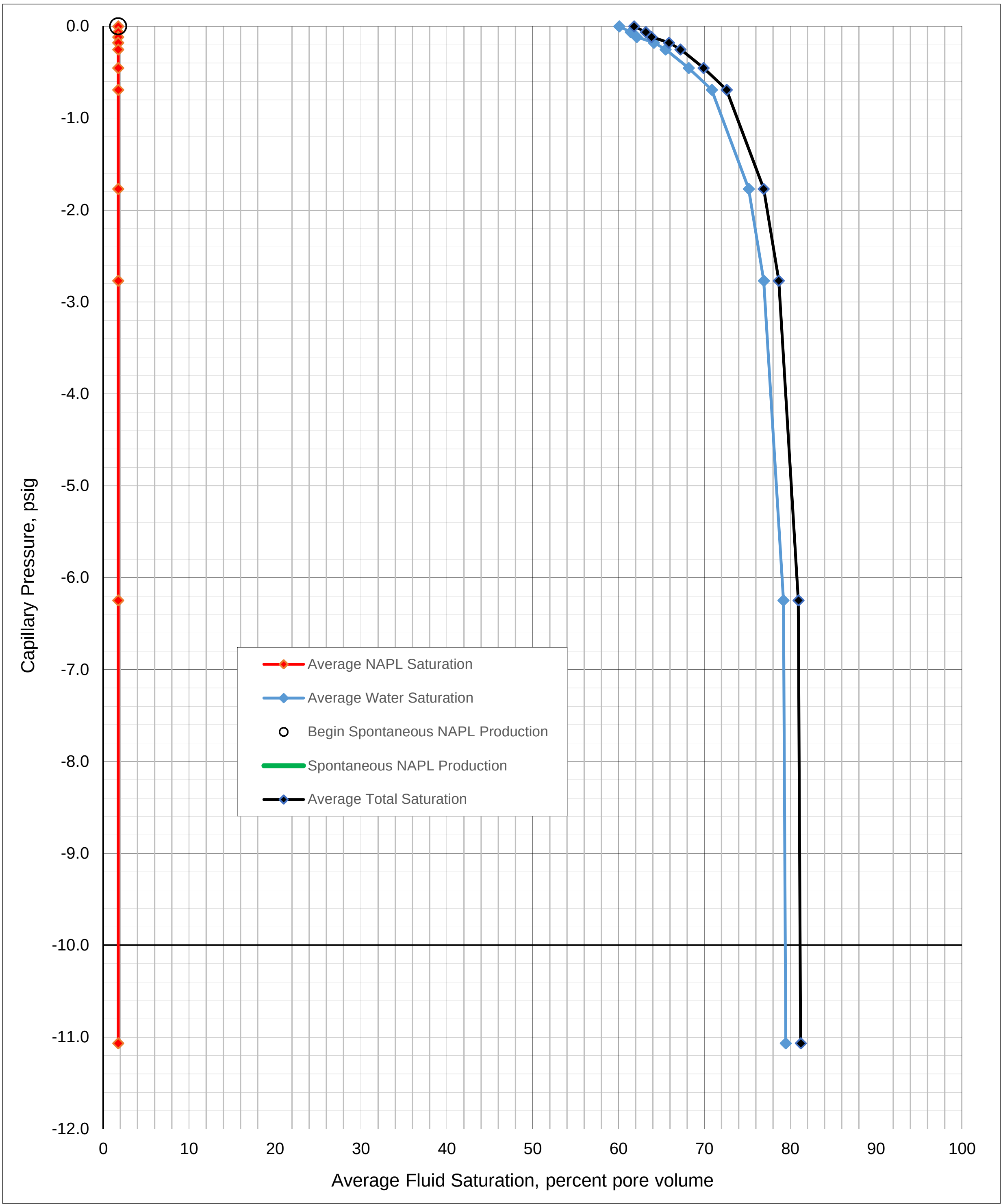
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-21 (11.2-11.7)
Depth, ft.: 11.5



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID DP-22 (13.5'-14.2') at 13.5 ft. Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	61.2	8.3	69.5
0.000	0.00	0.00	61.2	8.3	69.5
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	61.2	8.3	69.5
-0.062	-4.38	0.69	62.3	8.3	70.6
-0.114	-8.03	1.27	64.0	8.3	72.3
-0.179	-12.6	1.99	65.9	8.3	74.2
-0.251	-17.7	2.79	68.3	8.3	76.6
-0.455	-32.0	5.06	71.8	8.3	80.2
-0.693	-48.7	7.71	75.4	8.3	83.7
-1.77	-125	19.7	81.1	8.3	89.4
-2.78	-195	30.9	84.5	8.3	92.9
-6.27	-441	69.8	87.5	8.3	95.9
-11.11	-781	123.6	88.1	8.3	96.4

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

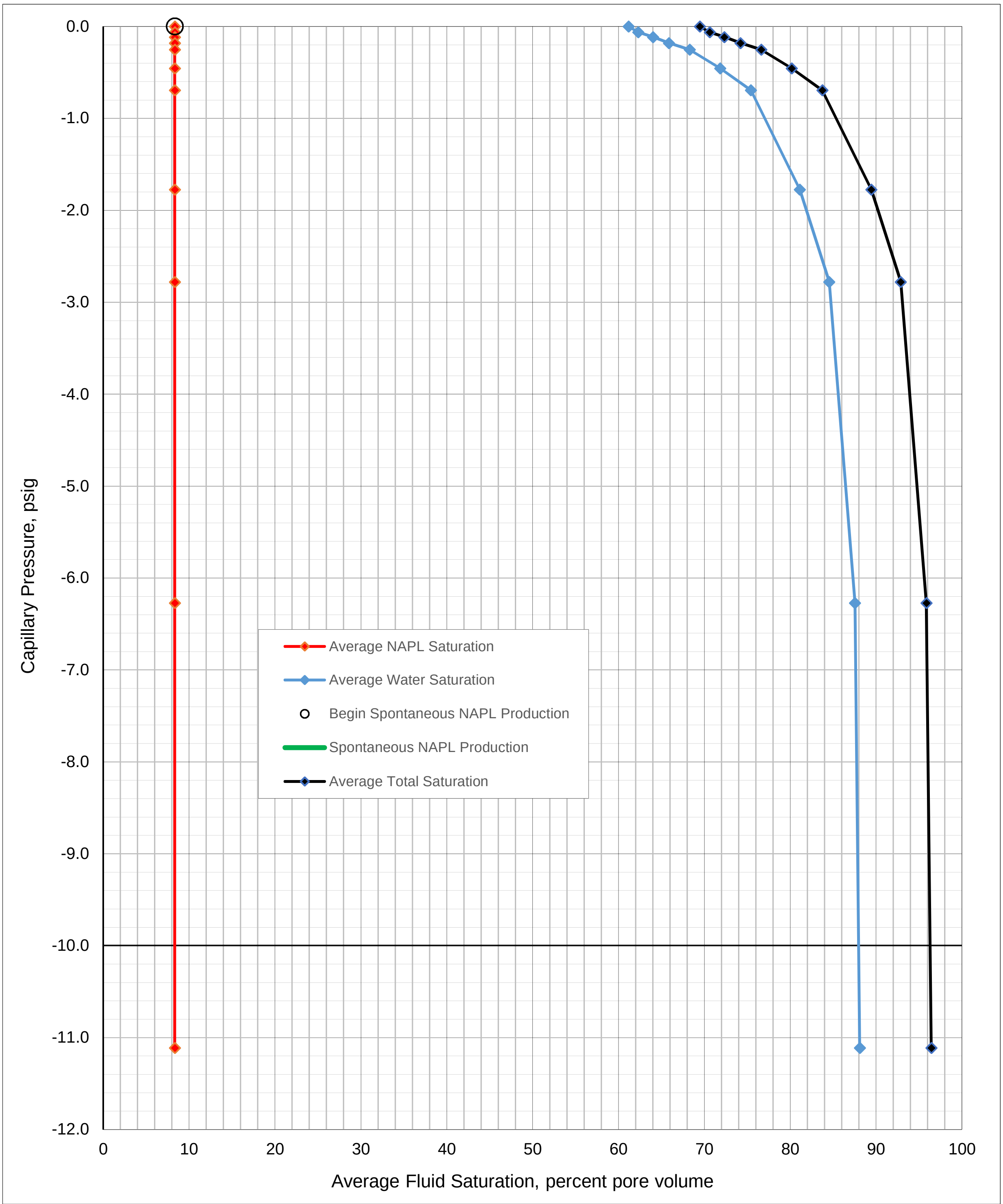
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-22 (13.5-14.2)
Depth, ft.: 13.5



PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table,	Sample ID		
			DP-23 (14.0'-14.7') at 14.0 ft.		
			Average Saturation, % pore volume		
psi	cm water	ft	Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	59.1	3.6	62.7
0.000	0.00	0.00	59.1	3.6	62.7
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	59.1	3.6	62.7
-0.062	-4.38	0.69	60.4	3.6	64.0
-0.114	-8.02	1.27	61.0	3.6	64.6
-0.179	-12.6	1.99	62.9	3.6	66.6
-0.251	-17.6	2.79	63.6	3.6	67.2
-0.454	-31.9	5.05	66.2	3.6	69.8
-0.692	-48.6	7.70	68.8	3.6	72.4
-1.77	-125	19.7	72.3	3.6	75.9
-2.77	-195	30.9	73.3	3.6	76.9
-6.26	-440	69.6	73.7	3.6	77.3
-11.09	-780	123.4	73.8	3.6	77.4

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

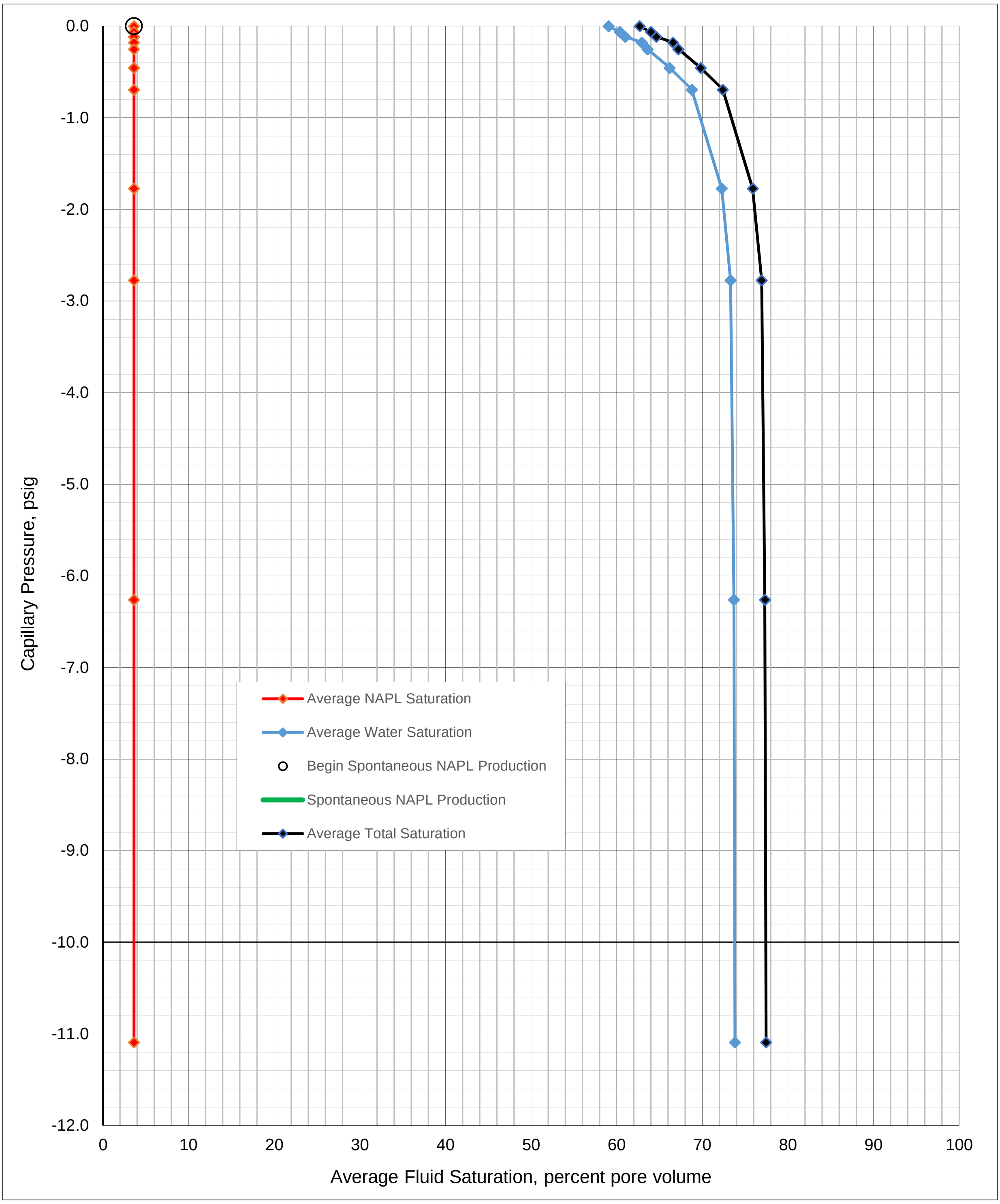
PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Sample ID: DP-23 (14-14.7)
Depth, ft.: 14.0



PTS Laboratories

PTS File No: 47478
Client: EHS Support LLC
Report Date: 02/08/18

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE TABULAR DATA

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name: Sherwin-Williams Gibbsboro, NJ
Project No: C05552_2017-200

Capillary Pressure		Height Above Water Table, ft	Sample ID: **DP-24 (13.5'-14.2') at 13.9 ft.** Average Saturation, % pore volume		
psi	cm water		Water	Oil (NAPL)	Total
Spontaneous Imbibition conducted on Native (As-received) Sample					
0.000	0.00	0.00	50.2	3.6	53.7
0.000	0.00	0.00	50.2	3.6	53.7
Centrifugal Imbibition following spontaneous imbibition					
0.000	0.00	0.00	50.2	3.6	53.7
-0.061	-4.32	0.68	51.9	3.6	55.5
-0.112	-7.91	1.25	56.3	3.6	59.9
-0.176	-12.4	1.96	60.7	3.6	64.3
-0.247	-17.4	2.75	66.0	3.6	69.6
-0.448	-31.5	4.98	72.2	3.6	75.7
-0.682	-48.0	7.59	75.5	3.6	79.1
-1.75	-123	19.4	81.5	3.6	85.1
-2.73	-192	30.4	84.5	3.6	88.1
-6.17	-434	68.7	88.0	3.6	91.6
-10.94	-769	121.7	88.9	3.6	92.5

Note: No visible NAPL produced during 12 hour spontaneous imbibition.

PTS File No:	47478
Client:	EHS Support LLC
Report Date:	02/08/18

PTS Laboratories

NATIVE STATE (AS-RECEIVED) IMBIBITION CAPILLARY PRESSURE GRAPH

ASTM D6836; Method E (Centrifugal Method: custom protocol; water displacing oil and air)

Project Name:	Sherwin-Williams Gibbsboro, NJ	Sample ID:	DP-24 (13.5-14.2)
Project No:	C05552_2017-200	Depth, ft.:	13.9

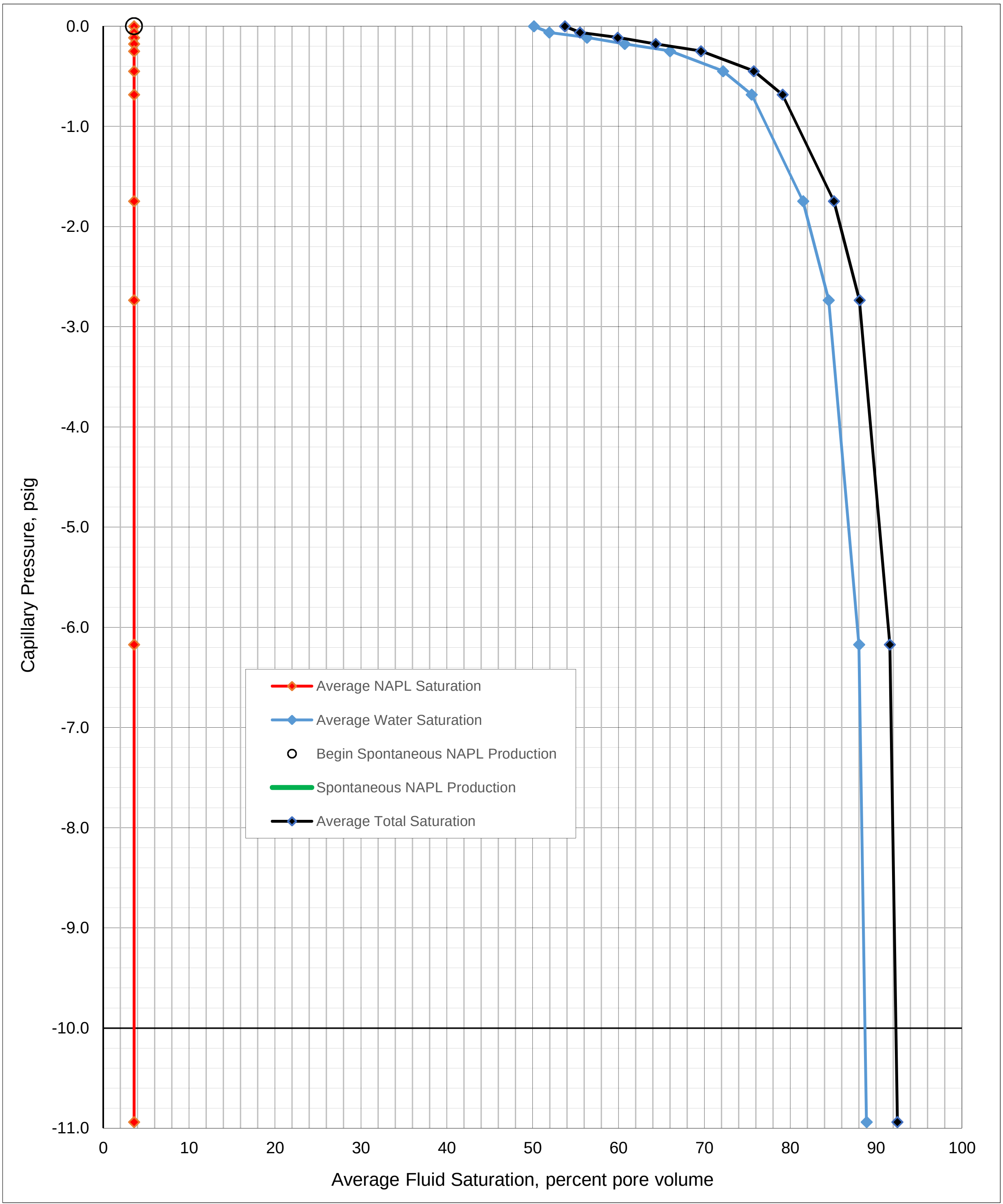


Table 1
Soil Sample Intervals for PTS Laboratory Analysis
Gibbsboro, NJ Project
November 14, 2017

Core Boring ID	Soil Core (ft)	Grain Size Analyses ASTM D446	Pore Fluid Sat. Package	Air/Water Displacing Oil Inhibition Tests, Capillary Pressure	Effective Drainage Porosity ASTM D425	Grain Size Analyses ASTM D446
DP-1	15.3-16	15.3-16	15.3-16	na	na	na
DP-2	12-12.6	12-12.6	12-12.6	na	na	na
DP-4	13.5-14.2	na	na	13.5-14.2	13.5-14.2	13.5-14.2
DP-5	11.5-12.2	11.5-12.2	11.5-12.2	na	na	na
DP-8	12-12.7	12-12.7	12-12.7	na	na	na
DP-9	8-8.8	na	na	8-8.8	8-8.8	8-8.8
DP-13	2.2-3, 6.5-7.2	6.5-7.2	6.5-7.2	2.2-3	2.2-3	2.2-3
DP-14	6.8-7.5, 13.5-14.2	13.5-14.2	13.5-14.2	6.8-7.5	6.8-7.5	6.8-7.5
DP-15	6.8-7.4, 11-11.7	11-11.7	11-11.7	6.8-7.4	6.8-7.4	6.8-7.4
DP-16	3.3-4	3.3-4	3.3-4	na	na	na
DP-17	1.9-2.5, 3-3.6, 4.4-5	1.9-2.5	1.9-2.5	3-3.6	3-3.6	3-3.6
		4.4-5	4.4-5	na	na	na
DP-18	3.5-4.2, 6.5-7.2	6.5-7.2	6.5-7.2	3.5-4.2	3.5-4.2	3.5-4.2
DP-20	6.2-6.8, 8-8.8	8-8.8	8-8.8	6.2-6.8	6.2-6.8	6.2-6.8
DP-21	10.7-11.2, 11.2-11.7, 14-14.6, 16.9-17.3	10.7-11.2	10.7-11.2	11.2-11.7	11.2-11.7	11.2-11.7
		14-14.6	14-14.6	na	na	na
		16.9-17.3	16.9-17.3	na	na	na
DP-22	7.3-8, 11.3-12, 13.5-14.2, 17.7-18.3, 20.5-21	7.3-8	7.3-8	13.5-14.2	13.5-14.2	13.5-14.2
		11.3-12	11.3-12	na	na	na
		17.7-18.3	17.7-18.3	na	na	na
		20.5-21	20.5-21	na	na	na
DP-23	11-11.7, 14-14.7, 16-16.7	11-11.7	11-11.7	14-14.7	14-14.7	14-14.7
		16-16.7	16-16.7	na	na	na
DP-24	13.5-14.2, 17-17.5	17-17.5	17-17.5	13.5-14.2	13.5-14.2	13.5-14.2

Notes:
= interval to be retained by PTS (interval was not collected during EHS Support lab visit).
na = not applicable